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# REPORT

OF THE

# STATE WATER COMMISSION OF CALIFORNIA

1917

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# REPORT

OF THE

# State Water Commission of California

PUBLISHED JANUARY 1, 1917

CALIFORNIA STATE PRINTING OFFICE
SACRAMENTO
1917

27485

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## STATE WATER COMMISSION.

HIRAM W. JOHNSON, *Governor* (ex officio)----------Sacramento, California
W. F. MCCLURE, *State Engineer* (ex officio)----------Sacramento, California
W. A. JOHNSTONE, *President*----------San Dimas, California
A. E. CHANDLER----------Berkeley, California
IRVING MARTIN----------Stockton, California

We are indebted for many of the photos from which cuts in this report were made to the San Francisco offices of the United States Forest Service and United States Geological Survey; also, to the State Mining Bureau for cuts of maps.

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1931

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## SUMMARY.

| | | | |
|---|---|---|---|
| Number of applications received to December 1, 1916 | | | 531 |
| Number of permits granted | | | 192 |
| Number of applications withdrawn | | | 39 |
| Number of applications rejected | | | 50 |
| Number of applications pending | | | 250 |
| Number of second-feet applied for: | | | |
| For agricultural | 91,360 second-feet | or 93 per cent | |
| For power | 4,892 second-feet | or 5 per cent | |
| For mining | 1,632 second-feet | or 1.7 per cent | |
| For muniicpal | 257 second-feet | or .3 per cent | |
| Of the permits granted there were: | | | |
| For agricultural | | | 162 |
| For mining | | | 23 |
| For power | | | 7 |
| Number of licenses issued | | | 4 |
| For agricultural | | | 3 |
| For power | | | 1 |

# LETTER OF TRANSMITTAL.

SAN FRANCISCO, California.

*To His Excellency,* THE GOVERNOR,
*State of California.*

SIR: We have the honor to herewith submit a report of the labors of this commission under the terms of the Water Commission Act (Statutes 1913, chapter 586), approved by your Excellency June 16, 1913, subjected to referendum, approved by popular vote November 3, 1914, and put into effect December 19, 1914. This report covers a period from March 1, 1915, to December 1, 1916.

Respectfully submitted this 20th day of December, 1916.

STATE WATER COMMISSION,
W. A. JOHNSTONE, *President.*
JOSEPHINE A. PATTEN, *Secretary.*

## ECONOMICAL USE.

"Along with the question of greater aid to settlers on California irrigation projects the economical use of irrigation water is coming to overshadow other irrigation problems in the state. Our studies of irrigation resources have indicated that there is sufficient irrigation water in California for less than one-half of the area which needs water or that will be greatly benefited by it. Even the irrigation of the 9,000,000 acres which it is estimated may ultimately be watered can be brought about only by the establishment of more economical standards of use than now prevail in many parts of the state. It is believed that the work of the State Water Commission can be of tremendous force in establishing a more economical irrigation practice, especially in northern and central California."—(Bulletin No. 1—State Department of Engineering Progress Report of Cooperative Irrigation Investigations in California, 1912–1914.)

# INTRODUCTION

The movement for businesslike legislation regarding the use of water is an old one in California. The office of state engineer was established in 1878 for "the acquirement of data upon which the state might formulate a policy and frame legislation respecting irrigation matters." Although the office continued for ten years and assembled much valuable data, it was unsuccessful in securing the desired legislation.

In 1900 the California Water and Forest Association, in cooperation with irrigation investigations of the United States Department of Agriculture, made a study of water right conditions on eight typical California streams, and in 1902 prepared a draft of a "water code" for submission to the legislature of 1903. The proposed bill was so little understood that the resulting opposition was too great to allow its introduction.

The State Conservation Commission was created on April 8, 1911, as an investigating body. At the same time the State Board of Control (water power) was created. On March 23, 1912, California's first State Water Commission took over the State Board of Control in so far as it related to the filing of applications to appropriate the use of water for power purposes. The act creating the State Board of Control (water power) and that creating the original State Water Commission were identical, with the exception that the term of license was extended from 25 to 40 years. Due to the efforts of the State Conservation Commission, the present water commission act was passed by the legislature in 1913. This gave the new commission, among other things, the authority to accept applications for the use of water for all purposes, the old commission having had authority for use of water for power purposes only. It also gave the commission wider powers, greatly increased the scope of water regulation generally, as may be seen by a perusal of the act, which appears elsewhere in this report.

This new act was suspended in its operation by a referendum petition, but in November, 1913, it was approved by a vote of the people at a general election and went into effect December 19, 1914. The commissioners were appointed in March, 1915, the work of the commission dating from that time. It was a new procedure to those who knew only of the old method of filing on water by posting notices on the stream and recording same in the county recorder's office.

The work of formulating the various blanks and forms, framing rules and regulations and systematizing the work required a great amount of labor. Today there is installed in the offices of the commission a thorough system of taking care of the business with speed and accuracy.

A large amount of data has been acquired, including all the filings on streams in the state from the time the first records were kept in the early history of California. These have been obtained by the commission from the books of the various county recorders. Herein lies one of the values of the new law, in that now all filings and applications for water are centralized in one office, instead of being scattered throughout every county of the state, making it possible to refer to them with much greater facility. Card systems, filing cabinets, loose-leaf books, maps, instruments, a comprehensive library, and many other valuable acquisitions have been accumulated, as a part of the work of the commission in its brief period of existence. Starting with practically nothing at all, and with little foundation to work from, and with such a complex subject to deal with, much of the work has naturally had to be that of organization of this class. This had to be done while progressing with the immediate work at hand, namely, the consideration of the applications submitted to the commission.

To December 1, 1916, there have been 531 applications submitted for the use of water for the purposes allowed by the act, viz: agricultural, power, mining and municipal. The routine of handling, alone, and the disposition of these applications in their various stages of progress through the office of the commission, requires a great amount of labor. Many of them have to be handled over and over again, due to many different causes such as errors, lack of knowledge on the part of applicants, incomplete information, or legal complications. Out of this number of applications 192 permits have been granted, and 89 were rejected or withdrawn. The remainder are in various stages of consideration. In this report will be found the applications submitted to the commission since its organization, arranged by counties, giving the names of applicants, sources of appropriation, amounts, number of acres to be irrigated, horsepower to be developed, character of mines operated, storage, estimated cost of each project where given, and status of the matter before the commission, and also permits granted.

The loyal support of all the various employees of this commission has been a great aid in its work. Regularity in hours, with little regard for the clock when anything was to be done, painstaking and cheerful in all their endeavors, those affiliated with the Water Commission have shown by their daily lives that a "job with the state," when honestly discharged, can be as diligently and efficiently performed as work for a private concern.

# FINANCIAL STATEMENT.

The following statement shows the expenditures of money made by the commission, and allotments made to federal departments in cooperation work. The expenditures of the commission cover a period of seventeen months—from July 1, 1915, to December 1, 1916. The allotments cover a period from July 1, 1915, to July 1, 1917:

| | |
|---|---|
| Commissioners' salaries | $21,250 00 |
| Employees' salaries | 25,630 68 |
| General office expense, including rent, furniture, supplies, postage, printing, etc. | 7,261 20 |
| Field work—including travel of commissioners and employees, and employment of minor field assistants | 7,256 01 |
| Federal departments— | |
| United States Geological Survey, stream measurements | 10,000 00 |
| United States Department of Agriculture | 1,700 00 |
| | $83,097 89 |

The filing fees received during the seventeen-month period, including annual license fees for licenses issued under chapter 41, amount to $14,784.73. These moneys have been transmitted to the State Controller and deposited in the state treasury to the credit of the general fund of the state, in accordance with the requirements of the act creating this commission.

# SECTION 20

**The Section Which Appears as a Clause in Every Application and Subject to Which All Permits and Licenses Are Granted by the Water Commission.**

It is understood and agreed that this application and the permit and license which may be granted hereunder shall be subject to all the conditions set forth in section 20 of the Water Commission Act (Statutes 1913, chapter 586), which is as follows:

SEC. 20. All permits and licenses for the appropriation of water shall be under the terms and conditions of this act, and shall be effective for such time as the water actually appropriated under such permits and licenses shall actually be used for the useful and beneficial purpose for which said water was appropriated, but no longer; and every such permit or license shall include the enumeration of conditions therein which in substance shall include all of the provisions of this section and likewise the statement that any appropriator of water, to whom said permit or license may be issued, shall take the same subject to such conditions as therein expressed; *provided*, that if, at any time after the expiration of twenty years after the granting of a license, the state, or any city, city and county, municipal water district, irrigation district, lighting district, or any political subdivision of the state shall have the right to purchase the works and property occupied and used under said license and the works built or constructed for the enjoyment of the rights granted under said license; and in the event that the said state, city, city and county, municipal water district, irrigation district, lighting district or political subdivision of the state so desiring to purchase and the said owner of said works and property can not agree upon said purchase price, said price shall be determined in such manner as is now or may hereafter be determined in eminent domain proceedings. If it shall appear to the state water commission at any time after a permit or license is issued as in this act provided that the permittee or licensee, or the heirs, successors or assigns of said permittee or licensee, has not put the water granted under said permit or license to the useful or beneficial purpose for which the permit or license was granted, or that the permittee or licensee, or the heirs, successors, or assigns of said permittee or licensee, has ceased to put said water to such useful or beneficial purpose, or that the permittee or licensee, or the heirs, successors or assigns of said permittee or licensee, has failed to observe any of the terms and conditions in the permit or license as issued, then and in that case the said commission, after due notice to the permittee, licensee, or the heirs, successors or assigns of such permittee or licensee, and a hearing thereon, may revoke said permit or license and declare the water to be unappropriated and open to further

appropriation in accordance with the terms of this act. And the findings and declaration of said commission shall be deemed to be prima facie correct until modified or set aside by a court of competent jurisdiction; *provided*, that any action brought so to modify or set aside such finding or declaration must be commenced within thirty days after the service of notice of said revocation on said permittee or licensee, his heirs, successors or assigns. And every licensee or permittee under the provisions of this act if he accept such permit or license shall accept the same under the conditions precedent that no value whatsoever in excess of the actual amount paid to the state therefor shall at any time be assigned to or claimed for any permit or license granted or issued under the provisions of this act, or for any rights granted or acquired under the provisions of this act, in respect to the regulation by any competent public authority of the services or the price of the services to be rendered by any permittee or licensee, his heirs, successors or assigns or by the holder of any rights granted or acquired under the provisions of this act, or in respect to any valuation for purposes of sale to or purchase, whether through condemnation proceedings or otherwise, by the state or any city, city and county, municipal water district, irrigation district, lighting district or any political subdivision of the state, of the rights and property of any permittee or licensee, or the possessor of any rights granted, issued, or acquired under the provisions of this act. The application for a permit by municipalities for the use of water for said municipalities or the inhabitants thereof for domestic purposes shall be considered first in right, irrespective of whether they are first in time; *provided, however*, that such application for a permit or the granting thereafter of permission to any municipality to appropriate waters, shall not authorize the appropriation of any water for other than municipal purposes, and providing further that where permission to appropriate is granted by the state water commission to any municipality for any quantity of water in excess of the existing municipal needs therefor, that pending the application of the entire appropriation permitted, the state water commission shall have the power to issue permits for the temporary appropriation of the excess of such permitted appropriation over and above the quantity being applied from time to time by such municipality; *and provided further*, that in lieu of the granting of such temporary permits for appropriation, the state water commission may authorize such municipality to become as to such surplus a public utility, subject to the jurisdiction and control of the railroad commission of the state of California for such period or periods from and after the date of the issuance of such permission to appropriate, as may be allowed for the application to municipal uses of the entire appropriation permitted; *and provided, further*, that when such municipality shall desire to use the additional water granted in its said application it may so do upon making just compensation for the facilities for taking, conveying and storing such additional water rendered valueless for said purposes, to the person, firm or corporation which constructed said facilities for the temporary use of said excess waters, and which compensation, if not agreed upon between the municipality and said person, firm or corporation, may be determined in the manner provided by law for determining the value of property taken by and through eminent domain proceedings.

# EARLIER EFFORTS IN WATER LEGISLATION.

## Experience in Arriving at the Present Conditions in Water Appropriation.

Two different systems of water rights are recognized in California—the riparian right and the prior appropriation right. The former is the one belonging to land bordering upon a stream. It is the common law right of England. As modified by the California Supreme Court, the riparian right entitled its owner to a reasonable use of the waters of the stream upon the land riparian thereto. It is recognized as the paramount right in California—the appropriator being entitled to the surplus only.

The right of prior appropriation is an outgrowth of the mining period. First public land was appropriated for its mineral wealth and later the waters of streams upon the public domain were diverted for use in connection with mining. As the mineral claims were marked by monuments and notices, so the custom grew of posting notices regarding water claims. This new doctrine of prior appropriation was early treated by the California courts and during the fifties and sixties the principles now recognized as basic were crystallized.

In 1872 a statute was adopted regarding the appropriation of water which was simply declaratory of the principles laid down by the courts. The sections of this statute (sections 1410 to 1422 of the Civil Code) continued as the only legislation upon the subject until the adoption of the present water commission act. The statute provided for the posting of a notice of appropriation stating the source of supply, the amount of water claimed, the means of diversion and the purpose and place of use. After posting, the notice had to be recorded in the office of county recorder and work on the diversion had to be commenced within sixty days and continued with reasonable diligence to completion. If the various steps were taken in accordance with the statute the right dated from the posting of the notice.

As the other western states were occupied and the necessity of diverting water arose, statutes similar to the California act of 1872 were adopted. The looseness of such a system when applied to so valuable a resource as the water supply first impressed Wyoming, where, in 1890, the present type of "modern water legislation" was enacted. The office of the state engineer was created and made the central office of record for water rights. The old method of posting notices was abandoned, and one wishing to appropriate water made application, on a printed form furnished by the state, to the state engineer. If there was unappropriated water in the source of supply, the state engineer approved

the application, which then became the permit, and in his approval fixed the time for beginning work, the time for completing work and the time for applying the water appropriated to beneficial use. Upon completion of the work and application to beneficial use to the satisfaction of the state engineer, a water right certificate was issued fixing the right of the appropriator as of the date of filing the application.

The appropriation was, therefore, under the supervision of the state engineer from start to finish. Wyoming accordingly has a definite official record of every appropriation of water made since 1891—that is, throughout its whole existence as a state. California, on the other hand, has tens of thousands of water claims in its county records, but nothing worth while can be ascertained regarding the status of such claims without a field inspection of the water courses.

The Wyoming system was adopted by Nebraska in 1895, by Utah and Idaho in 1903, by Nevada, North Dakota, Oklahoma and South Dakota in 1905, by New Mexico in 1907, by Oregon in 1909, by California for power purposes only in 1911, and by California for all purposes and by Texas in 1913. The California act, however, was withheld by referendum and became effective December 19, 1914.

The new California legislation contains one feature regarding new appropriations not contained in the legislation of any other western state, and that is the provision for the noncapitalization of water rights. The attitude of the state is that one should be allowed to appropriate water and divert it as long as he can apply it to beneficial use, but that he should not be allowed to capitalize such right for rate fixing purposes, or for purposes of sale to a political unit.

As stated above, the California statute of 1872 provided only for the initiation of the appropriation. There was no legislation regarding court procedure in water right litigation. The result was that actions in connection with water rights had to be brought in the same way as all other real property actions. On many streams several actions have been brought without all of the rights being determined—that is, "A" could sue "B," "B" sue "D," "C" sue "A" and so on to the limit of the combination of the single diversions. The folly of this lack of system so early appealed to Colorado that by its statutes of 1879–1881 a special court procedure was adopted, so that all the claims to the use of water from a single source of supply within a designated water district could be adjudicated in a single action. This method was improved upon by Wyoming in 1890–1891 by giving to the Board of Control, composed of the state engineer and the four superintendents of the divisions into which the state was divided, the authority to determine existing rights upon stream systems. This so-called administrative method was an innovation in the determination of real property

rights, but was upheld by the Wyoming Supreme Court. Nebraska in 1895 and Nevada in 1903 adopted a similar system.

Idaho and Utah in 1903, North Dakota, Oklahoma and South Dakota in 1905, and New Mexico in 1907 adopted statutes providing for a special court procedure, so that all the claims to water from a single source of supply might be adjudicated in one proceeding after the necessary physical data had been assembled by the state engineer. These states adopted the "court procedure" rather than the "administrative procedure" for the reason that they believed the "administrative procedure" would be held invalid by their supreme courts. Oregon in 1909 adopted a combination of the two procedures. It followed Wyoming so far as the determination by the Board of Control is concerned, but provided that the determination should be immediately submitted to the Circuit Court for confirmation or modification in a comparatively simple proceeding.

As stated above, the Wyoming "administrative method" was upheld by the Wyoming Supreme Court. It was, likewise, upheld in Nebraska, but not in Nevada, where, as in a recent case the Supreme Court expressed itself against the method as a conclusive one, the statute was modified in order to follow the new Oregon method. The Supreme Courts of Idaho and South Dakota have declared their statutes along this line invalid in many respects. It is gratifying, therefore, to know that the United States Supreme Court has recently upheld the validity of the Oregon method. With this strong endorsement it is certain that the method will be adopted in other states than Oregon and Nevada. Under the water commission act in California the procedure for the determination of rights is similar to the Oregon method, with the exception that after the determination by the commission an action in the courts must be initiated in the regular way, instead of as in Oregon going to the court directly for confirmation or modification. The California commission proposes to secure an amendment at the next session of the legislature making the California system identical with the Oregon system in this respect.

Even in those few cases in California where all the rights upon a stream were adjudicated in a single action, there was no method recognized by statute for placing an officer upon the stream to divide the waters in accordance with the decree. The result was that either force had to be resorted to, or an action for contempt proceedings had to be initiated in case any one of the litigants failed to abide by the decree. The Colorado statutes of 1879–1881 provided a splendid system for the appointment of water commissioners or water masters to divide the water in accordance with the decree of the court under the special procedure. This method has been adopted in all of the states enumerated above with the exception of Texas and California, and it is proposed to ask for legislation adopting it in California at the next session.

From the above it may be seen that there are three main points to be covered in water legislation:

*First* (in the order of presentation above)—The control of new appropriations.

*Second*—The determination or adjudication of existing rights

*Third*—The division of water among those entitled to its use.

The third is the real goal to be sought, and the other two are merely incidental thereto. As shown, the modern legislation has been adopted in all of the western states with the exception of Washington, Montana, Kansas and Arizona. It is based upon simple business principles, and, although there may have been objections to its introduction due to lack of knowledge of its scope, such objections have always disappeared after the statutes have become operative.

# THE CALIFORNIA WATER COMMISSION ACT.

## CHAPTER 586.

*An act to regulate the use of water which is subject to such control by the state of California, and in that behalf creating a state water commission; specifying and providing for the appointment of the members of said commission; fixing the terms of office and compensation of the members of said commission; fixing the powers, duties and authority of said commission and its members; providing for the filling of vacancies in the membership of said commission; providing for the removal from office of the appointed members of said commission; providing for the cooperation of courts with said commission; providing that certain courts shall take judicial notice of certain acts of the state water commission; specifying the duties of all persons summoned as witnesses before said commission or any of its members; appropriating money for carrying out the provisions of this act; providing for the payment of the indebtedness and expenses of said commission, its members and employees; declaring what water is unappropriated; providing for the utilization of water and the works necessary to such utilization to the full capacity of streams or of such portion or portions of such capacity as the public good many require; declaring what water may be appropriated; declaring that the nonapplication for ten consecutive years of any portion of the waters of any stream to lands riparian to such stream shall be conclusive presumption that the use of such nonapplied water is not needed on said riparian lands for a useful or beneficial purpose; declaring that such nonapplied water shall be deemed to be in the use of the state and subject to appropriation; declaring the duties of those who desire to appropriate water; declaring the periods for which water may be appropriated and the conditions under which water may be appropriated; providing for the payment of fees and charges by the applicants for permission to appropriate water and by the appropriators of water; providing for the ascertainment and adjudication of water rights; providing for the bringing of actions by certain persons, or, upon the direction of the state water commission, by the attorney general, for the quieting of title to water rights; specifying certain duties of the claimants, possessors or users of water or water rights; declaring water rights forfeited under certain conditions; regulating the appropriation of water; excepting cities, cities and counties, municipal water districts, irrigation districts and lighting districts from certain provisions of this act; defining certain words and terms used in this act; repealing all acts or parts of acts in conflict with this act; declaring how this act shall be known; making legislative declaration concerning those parts of this act which may not be declared unconstitutional.*

[Approved June 16, 1913.]

*The people of the state of California do enact as follows:*

SECTION 1. For the purpose of carrying out the provisions of this act a state water commission consisting of five persons is hereby created

and established. Two members of said commission shall be, ex officio, the governor of the state and the state engineer, respectively. Three members of said commission shall be appointed by the governor for the term of four years; *provided, however,* that of the members first appointed one shall be appointed to hold office until the first day in January, nineteen hundred and fourteen, one until the first day in January, nineteen hundred and fifteen, and one until the first day in January, nineteen hundred and sixteen. Such appointive commissioners shall be men of practical knowledge or experience in the application and use of waters for irrigation, mining and municipal purposes, and shall be so appointed that at least one thereof shall have had practical knowledge and experience in the use of water for agricultural purposes, and one thereof shall have had practical knowledge and experience in the use of water for mining purposes, and one thereof shall have had practical knowledge and experience in the use of water for municipal purposes. The commissioners shall elect one of their number president of the commission. The appointed members of said commission shall each receive as compensation for his services the sum of five thousand dollars per annum. No commissioner who is directly or indirectly interested in any matter before the commission shall sit with the commission during the hearing of such matter; nor shall he be detailed by the commission to investigate or report on any such matter; nor shall he take part in any determination of any such matter. But the governor shall have the power and authority, upon request of the commission, to appoint *pro tempore* some disinterested person to sit and act in the place and stead of such interested commissioner. Such *pro tempore* commissioner shall have compensation for the time of service equal to the compensation of a commissioner during such service and shall have the power and authority of the same, only in the matter for the investigation and determination of which he shall have been appointed and his connection with the commission shall cease and determine upon the completion of the investigation and determination for which he was appointed. But the commissioner in whose place and stead he sits shall have power, compensation and authority in all other cases.

SEC. 2. Whenever a vacancy in the state water commission shall occur, the governor shall forthwith appoint a qualified person to fill the same for the unexpired term. The legislature, by a two-thirds vote of all members elected to each house, or the governor, may remove any one or more of the appointed commissioners from office. The commission shall have a seal bearing the following inscription: State water commission of California. The seal shall be affixed to all authentications of copies of records and to such other instruments as the commission may direct. All courts shall take judicial notice of said seal.

SEC. 3. A majority of the appointed commissioners shall constitute a quorum for the transaction of any business, for the performance of any duty, or for the exercise of any power of the commission. No vacancy in the commission shall impair the right of the remaining commissioners to exercise all the powers of the commission. The act of a majority of the commissioners present, when in session as a board, shall be deemed to be the act of the commission; but any investigations, inquiry or hearing which the commission has power to undertake or hold may be undertaken or held by or before any commissioners or commissioner

designated for the purpose by the commission; and every finding, order, ascertainment or decision made by the commissioners or the commissioner so designated pursuant to such investigation, inquiry or hearing, when approved by the commission and ordered filed in its office, shall be and be deemed to be the finding, order, ascertainment or decision of the commission.

SEC. 4. (*a*) Each commissioner shall have power to administer oaths, certify to all official acts, and to issue subpœnas for the attendance of witnesses and the production of papers, books, maps, accounts, documents and testimony in any inquiry, investigation, hearing, ascertainment or proceeding ordered or undertaken by the commission in any part of the state. Each witness who shall appear by order of the commission or any commissioners or a commissioner shall receive for his attendance the same fees and mileage allowed by law to witnesses in civil cases, which amount shall be paid by the party at whose request such witness is subpœnaed. When any witness who has not been required to attend at the request of any party shall be subpœnaed by the commission his fees and mileage shall be paid from the funds appropriated for the use of the commission in the same manner as other expenses of the commission are paid. Any witness subpœnaed, except one whose fees and mileage may be paid from the funds of the commission, may, at the time of service, demand the fee to which he is entitled for travel to and from the place at which he is required to appear and one day's attendance. If such witness demands such fees at the time of service, and they are not at that time paid or tendered, he shall not be required to attend before the commission or commissioners as directed in the subpœna. All fees and mileage to which any witness is entitled under the provisions of this section may be collected by action therefor instituted by the person to whom such fees are payable. But no witness shall be compelled to attend as a witness before the water commission or any water commissioner or water commissioners out of the county in which he resides, unless the distance be less than thirty miles from his place of residence to the place of hearing.

(*b*) The superior court of the county or city and county in which any inquiry, investigation, hearing or proceedings may be held by the commission or any commissioner or commissioners shall have the power to compel the attendance of witnesses and the production of papers, maps, books, accounts, documents and testimony as required by any subpœna issued by the commission or any commissioner or commissioners. The commission, commissioners or commissioner before whom the testimony is to be given or produced may, in case of the refusal of any witness to attend or testify or produce any papers, maps, books, accounts or documents required by such subpœna, report to the superior court in and for the county or city and county in which the proceeding is pending by petition, setting forth that due notice has been given of the time and place of attendance of said witness, or for the production of said papers, maps, books, accounts or documents and that the witness has been summoned in the manner prescribed in this act, and that the witness has failed and refused to attend or produce the papers, maps, books, accounts or documents required by the subpœna before the commission, commissioners, or commissioner in the cause or proceeding named in the notice and subpœna, or has refused to answer questions propounded to him in the course of such cause or proceeding, and ask

an order of said court, compelling the witness to attend, testify, and produce said papers, maps, books, accounts or documents before the commission, or commissioners, or commissioner. The court, upon the petition of the commission or commissioners or commissioner, shall enter an order directing the witness to appear before the court at a time and place to be fixed by the court in such order, the time to be not more than ten days from the date of the order, and then and there show cause, if any he have, why he refused to obey said subpœna, or refused to answer questions propounded to him by said commission, or any commissioners or any commissioner, or neglected, failed or refused to produce before said commission, or any commissioners or any commissioner the books, papers, maps, accounts or documents called for in said subpœna. A copy of said order and the petition therefor shall be served upon said witness. If it shall appear to the court that said subpœna was regularly issued by the commission or any commissioners or a commissioner, the court shall thereupon enter an order that said witness appear before the commission or commissioners or commissioner at the time and place fixed in said order, and testify or produce the required papers, maps, books, accounts or documents, or both testify and produce; and upon failure to obey said order said witness shall be dealt with as for contempt of court.

(*c*) The state water commission or any commissioners or commissioner, or any party to a proceeding before the commission or any commissioners or any commissioner, may in any investigation or hearing before the commission or any commissioners or any commissioner cause the deposition of witnesses residing within or without the state to be taken in the manner prescribed by law for depositions in civil actions in the superior courts of this state.

(*d*) No person shall be excused from testifying or from producing any book, map, document, paper or account in any investigation or inquiry by or hearing before the commission or any commissioners or commissioner upon the ground that the testimony or evidence, book, map, document, paper or account required of him may tend to incriminate him or subject him to penalty or forfeiture. But no person shall be prosecuted, punished or subjected to any penalty or forfeiture for or on account of any act, transaction, matter or thing material to the matter under investigation by said commission, or any commissioners, or any commissioner concerning which he shall have been compelled to testify or to produce documentary evidence; *provided,* that no person so testifying or producing shall be exempt from prosecution and punishment for any perjury committed by him in his testimony.

SEC. 5. A full and accurate record of business or acts performed or of testimony taken by the commission or any member or members thereof in pursuance of the provisions of this act shall be kept and be placed on file in the office of said water commission.

SEC. 6. The state water commission shall take, charge and collect the following fees: for copies and records not required to be certified or otherwise authenticated by the commission, ten cents for each folio; for certified copies of official documents and orders filed in its office, fifteen cents for each folio, and one dollar for every certificate under seal affixed thereto; for certified copies of evidence and proceedings before the commission, fifteen cents for each folio. The commission may fix reasonable charges for publications issued under its authority. All

fees charged and collected under this section shall be paid, at least once each week, accompanied by a detailed statement thereof, into the treasury of the state.

SEC. 7. For the purpose of carrying out the provisions of this act the state water commission is authorized to pass such necessary rules and regulations as it may from time to time deem advisable, and to appoint and remove at its pleasure a secretary who shall have charge of its books and records and perform such other duties as from time to time may be prescribed and whose salary shall be fixed by the water commission; and the state water commission may also employ such expert, technical and clerical assistance, and upon such terms as it may deem proper.

SEC. 8. For the purpose of carrying out the provisions of this act the sum of fifty thousand dollars is hereby appropriated for the fiscal years 1913–1914 and 1914–1915 out of any money in the state treasury not otherwise appropriated; and the state controller is hereby authorized and directed to draw warrants upon such sum from time to time upon the requisition of the state water commission approved by the state board of control, and the state treasurer is hereby authorized and directed to pay such warrants.

SEC. 9. All indebtedness incurred for salaries, and all necessary costs in traveling and other expenses of said commission, and each of its members and persons employed by it, while actually engaged in the business of said commission, shall be paid by the state out of the funds hereby appropriated, upon the sworn statement of the person or persons incurring such indebtedness, and upon the requisition of the state water commission, approved by the state board of control, and the state controller is hereby authorized to draw warrants upon the state treasurer for said indebtedness, salaries, costs and expenses, as provided by law for the payment of similar costs and expenses and the drawing of similar warrants.

SEC. 10. The state water commission is hereby authorized and empowered to investigate for the purpose of this act all streams, stream systems, portions of stream systems, lakes, or other bodies of water, and to take testimony in regard to the rights to water or the use of water thereon or therein, and to ascertain whether or not such water, or any portion thereof, or the use of said water or any portion thereof, heretofore filed upon or attempted to be appropriated by any person, firm, association, or corporation, is appropriated under the laws of this state.

SEC. 11. All water or the use of water which has never been appropriated, or which has been heretofore appropriated and which has not been in process, from the date of the initial act of appropriation, of being put, with due diligence in proportion to the magnitude of the work necessary properly to utilize for the purpose of such appropriation such water or the use of water, or which has not been put, or which has ceased to be put to some useful or beneficial purpose, or which may hereafter be appropriated and cease to be put, to the useful or beneficial purpose for which it was appropriated, or which in the future may be appropriated and not be, in the process of being put, from the date of the initial act of appropriation, to the useful or beneficial purpose for which it was appropriated, with due diligence in proportion to the magnitude of the work necessary properly to utilize for the purpose of

such appropriation such water or the use of water, is hereby declared to be unappropriated. And all waters flowing in any river, stream, canyon, ravine or other natural channel, excepting so far as such waters have been or are being applied to useful and beneficial purpose upon, or in so far as such waters are or may be reasonably needed for useful, and beneficial purposes upon lands riparian thereto, or otherwise appropriated, is and are hereby declared to be public waters of the state of California and subject to appropriation in accordance with the provisions of this act. If any portion of the waters of any stream shall not be put to a useful or beneficial purpose to or upon lands riparian to such stream for any continuous period of ten consecutive years after the passage of this act, such nonapplication shall be deemed to be conclusive presumption that the use of such portions of the waters of such stream is not needed upon said riparian lands for any useful or beneficial purpose; and such portion of the waters of any stream so nonapplied, unless otherwise appropriated for a useful and beneficial purpose, is hereby declared to be in the use of the state and subject to appropriation in accordance with the provisions of this act. In any case where a reservoir or reservoirs have been or shall hereafter under the provisions of this act be constructed or surveyed, laid out and proposed to be constructed for the storage of water for a system, which water is to be used at one or more points under appropriations of water heretofore or hereafter made, which appropriations and rights thereunder are now, or shall hereafter be held and owned by the person or corporation owning such reservoir site or sites and constructing such reservoir or reservoirs, such reservoir or reservoirs and appropriations and rights shall, in the discretion of the state water commission, constitute a single enterprise and unit, and work of constructing such reservoir or reservoirs, or any of them, or work on any one of such appropriations shall, in the discretion of said commission, be sufficient to maintain and preserve all such applications for appropriations and rights thereunder.

SEC. 12. The state water commission shall have authority to, and may, for good cause shown, upon the application of any appropriator or user of water under an appropriation made and maintained according to law prior to the passage of this act, prescribe the time within which the full amount of the water appropriated shall be applied to a useful or beneficial purpose; *provided,* that said appropriator or user shall have proceeded, with due diligence in proportion to the magnitude of the project, to carry on the work necessary to put the water to a beneficial use; and in determining said time said commission shall grant a reasonable time after the construction of the works or canal or ditch or conduits or storage system used for the diversion, conveyance or storage of water; and in doing so said commission shall also take into consideration the cost of the application of such water to the useful or beneficial purpose, the good faith of the appropriator, the market for water or power to be supplied, the present demand therefor, and the income or use that may be required to provide fair and reasonable returns upon the investment and any other facts or matters pertinent to the inquiry. Upon prescribing such time the state water commission shall issue a certificate showing its determination of the matter. For good cause shown, the state water commission may extend the time by granting further certificates. And, for the time so prescribed or

extended, the said appropriator or user shall be deemed to be putting said water to a beneficial use.

And if at any time it shall appear to the state water commission, after a hearing of the parties interested and an investigation, that the full capacity of the works built or constructed, or being built or constructed, under an appropriation of water or the use thereof made under the provisions of this act has not developed or can not develop the full capacity of the stream at the point where said works have been or are being built or constructed, and that the holder of the said appropriation will not or can not, within a period deemed to be reasonable by the commission, develop the said stream at said point to such a capacity as the commission deems to be required by the public good, then and in that case the said commission, in its discretion, may permit the joint occupancy and use, with the holder of the appropriation, to the extent necessary to develop the stream to its full capacity or to such portion of said capacity as may appear to the state water commission to be advisable, by any and all persons, firms, associations, or corporations applying therefor, of any dam, tunnel, diversion works, ditch, or other works or constructions already built or constructed or in process of being built or constructed under this act; *provided,* that said commission shall take into consideration the reasonable cost of the original and new work, the good faith of the applicant, the market for water or power to be supplied by the original and the new work, and the income or use that may be required to provide fair and reasonable returns upon such cost; *provided, further,* that the applicant or applicants shall be required to pay to the party or parties owning said dam, tunnel, diversion works, ditch, or other works or constructions a pro rata portion of the total cost of the old and the new works, said pro rata portion to be based upon the proportion of the water used by the original and the subsequent users of said dam, tunnel, diversion works, ditch, or other works or constructions, if the water is used or to be used for irrigation or domestic purposes; or, if the water is used or to be used for the generation of electricity or electrical or other power, the said pro rata portion shall be based upon the relative amount of electricity or electrical or other power capable of being developed by the original and the new works; or, if a portion of the water utilized under a joint occupancy of any dam, tunnel, diversion works, ditch or other works or construction, shall be used for the purpose of irrigation and another portion of said water shall be used for the generation of electricity or electrical or other power, then and in that case the applicant or applicants for joint occupancy shall be required to pay to the party or parties owning said dam, tunnel, diversion works, ditch, or other works or constructions a pro rata portion of the total cost of the old and new works, said pro rata portion to be based upon the proportion of the relative amount of water used by each joint occupant and the income derived by each said joint occupant from said joint occupancy; or, if any of the waters used under such joint occupancy shall be utilized for purposes other than those specified above, then and in that case the applicant or applicants for such joint occupancy shall be required to pay to the party or parties owning said dam, tunnel, diversion works, ditch, or other works or constructions, such a pro rata portion of the total cost of the old and new works as shall appear to the state water commission to be just and equitable. Said applicant or applicants

shall also be required to pay a proper pro rata share, based as above, of the cost of maintaining said dam, tunnel, diversion works, ditch or other works or constructions, on and after beginning the occupancy and use thereof. Furthermore, the state water commission if it appears to the said commission that the full capacity of the works built or constructed, or being built or constructed, under an appropriation of water or the use thereof under this act, will not develop the full capacity of the stream at that point, and it appears to the commission that the public good requires it, and the commission specifically so finds after investigation and hearing of the parties interested, may permit any person, firm, association or corporation to repair, improve, add to, supplement, or enlarge, at his or its proper cost, charge and expense, any dam, tunnel, diversion works, ditch, or other works or constructions already built or constructed or in process of being built or constructed under the provisions of this act, and to use the same jointly with the owners thereof; *provided,* that the said repairing, improving, adding to, supplementing, or enlarging, shall not materially interfere with the proper use thereof by the owner of said dam, tunnel, diversion works, ditch, or other works or constructions or shall not materially injure said dam, tunnel, diversion works, ditch or other works or constructions. And the state water commission shall determine the pro rata and other costs provided for in this section.

SEC. 13. All rights granted or declared by this act shall be ascertained, adjudicated and determined in the manner and by the tribunals as provided in this act.

SEC. 14. This act shall not be held to bestow, except as expressly provided in this act, upon any person, firm, association or corporation, any right where no such right existed prior to the time this act takes effect.

SEC. 15. The state water commission shall allow, under the provisions of this act, the appropriation of unappropriated water or of the use thereof, or of water or of the use thereof which may hereafter cease to be appropriated, or which may hereafter be declared to be unappropriated, or which, having been used under claim of riparian proprietorship or appropriation finds its way back into a stream, lake or other body of water and also such water as is declared under section eleven of this act to be subject to appropriation.

SEC. 16. Every application for a permit to appropriate water shall set forth the name and post-office address of the applicant, the source of water supply, the nature and amount of the proposed use, the location and description of the proposed headworks, ditch, canal and other works; the proposed place of diversion and the place where it is intended to use the water; the time within which it is proposed to begin construction, the time required for completion of the construction, and the time for the complete application of the water to the proposed use. If for agricultural purposes, the application shall, besides the above general requirements, give the legal subdivisions of the land and the acreage to be irrigated, as near as may be; if for power purposes, it shall give, besides the general requirements prescribed above, the nature of the works by means of which the power is to be developed, the head and amount of water to be utilized, and the use to which the power is to be applied; if for storage in a reservoir, it shall give, in addition to the general requirements prescribed above, the height of dam, the

capacity of reservoir, and the use to be made of the impounded waters; if for municipal water supply, it shall give, besides the general requirements specified above, the present population to be served, and, as near as may be, the future requirements of the city; if for mining purposes, it shall give, in addition to the general requirements prescribed above, the nature and location of the mines to be served and the methods of supplying and utilizing the water. All applications shall be accompanied by as many copies of such maps, drawings, and other data as may be prescribed or required by the state water commission, and such maps, drawings, and other data shall be considered as part of the application. If any permittee or licensee, or the heirs, successors, or assigns of any permittee or licensee, desire to change the point of diversion from the point of diversion specified in the original application, or after the granting of any permit or license, such change or changes may be made only upon the permission of the state water commission; *provided,* that, before granting such permission, such applicant must establish, to the satisfaction of the state water commission, and such commission must so find, that such change in the place of diversion will not operate to the injury of any other appropriator or legal user of such waters before permitting such change in the place of the diversion. Upon receipt of application for permission to make such change in the place of diversion, the commission shall, by order, fix a time within which any person interested may appear in opposition to such application, and such applicant shall, if the commission so require, cause to be published at least once a week for four consecutive weeks, in a newspaper or newspapers of general circulation in the county in which is situated both the old and new points of diversion, a copy of said order. Proof of such publication shall be by affidavit of the publisher of such newspaper. Should any objection be made to the change in point of diversion so applied for, the state water commission shall fix a time for the hearing of said application and of the objections thereto, which time shall be not less than thirty days nor more than sixty days after the period of said publication, and upon such hearing the said commission shall grant or refuse, as the facts shall warrant, such permission to change place of diversion.

SEC. 17. Any person, firm, association or corporation may apply for and secure from the state water commission, in conformity with this act and in conformity with reasonable rules and regulations adopted from time to time by the state water commission, a permit for any unappropriated water or for water which having been appropriated or used flows back into a stream, lake or other body of water within this state. And any application so made shall give to the applicant a priority of right as of the date of said application to such water or the use thereof until such application shall have been approved or rejected by said commission; *provided,* that such priority shall continue only so long as the provisions of law and the rules and regulations of the water commission shall be followed by the applicant. Upon the approval of any application by the commission, said approval shall give priority of right as of the date of said application, and shall give the right to take and use the amount of water specified in said approval until the issuance by the state water commission of a license for the use of said amount of water, or until the said commission refuses to issue said license. But the approval of any application shall give the right to

take and use water only to the extent and for the purpose allowed in said approval; *provided,* that any defective application made in a bona fide attempt to conform to the rules and regulations of the state water commission and to the law shall secure to the applicant a priority of right as of the date of said application until he shall have been notified by said commission in what respect his application is defective. And said applicant shall be allowed sixty days after notice of said defect in which to file an amended and perfected application. If, within said sixty days, said applicant shall not file an amended and perfected application, said priority of right shall cease and determine, unless for good cause shown the state water commission shall allow said applicant to file a further amended and perfected application; *provided, also,* that any priority of right secured under this section shall not be effective for more than thirty days after service of notice of such approval, personally or by registered mail, on the applicant, unless within said period of thirty days a true copy of said approval upon which such priority is based shall have been filed in the office of the recorder of the county or city and county in which the water is to be diverted, and, within ten days thereafter, a certificate of such filing by the county recorder is also filed with the state water commission.

SEC. 18. Actual construction work upon any project shall begin within such time after the date of the approval of the application as shall be specified in said approval which time shall not be less than sixty days from date of said approval, and the construction of the work thereafter shall be prosecuted with due diligence in accordance with this act, the terms of the approved application, and the rules and regulations of said commission; and said work shall be completed in accordance with law, the rules and regulations of the state water commission, and the terms of the approved application and within a period specified in the permit; but the period of completion specified in the permit may, for good cause shown, be extended by the state water commission. And if such work be not so commenced, prosecuted and completed, the water commission shall, after notice in writing and mailed in a sealed, postage-prepaid and registered letter addressed to the applicant at the address given in his application for a permit to appropriate water, and a hearing before the commission revoke its approval of the application. But any applicant, the approval of whose application shall have been thus revoked, shall have the right to bring an action in the superior court of the county in which is situated the point of proposed diversion of the water for a review of the order of the commission revoking said approval of the application. And thirty days after the revocation of said permit all rights of the said permittee under said permit shall cease and lapse, unless said permittee shall within said thirty days after said revocation bring an action in the superior court for a review of the order of revocation. The priority of right of any permittee so bringing an action shall continue under said permit until a final judgment is rendered as to the reasonableness of the revocation of said permit. But until and unless the revocation of the permit shall be finally decreed by such court, the permittee shall not take or use any of the water the right to take and use which is granted by said permit.

SEC. 19. Immediately upon completion, in accordance with law, the rules and regulations of the state water commission, and the terms of

the permit, of the project under such application, the holder of a permit for the right to appropriate water shall report said completion to the state water commission. The said commission shall immediately thereafter cause to be made a full inspection and examination of the works constructed and shall determine whether the construction of said works is in conformity with law, the terms of the approved application, the rules and regulations of the state water commission, and the permit. The said water commission shall, if said determination is favorable to the applicant, issue a license which shall give the right to the diversion of such an amount of water and to the use thereof as may be necessary to fulfill the purpose of the approved application. Said license shall be in such form as may be prescribed by the state water commission under the provisions of this act. But if the said commission shall find, upon inspection and examination of the works constructed, that the construction and condition of said works are not in conformity with the law, the rules and regulations of the state water commission, the terms of the approved application and the terms of the permit, then and in that case the said commission may, after due notice in writing and in the manner provided in sections one thousand and eleven, one thousand and twelve, and one thousand and thirteen of the Code of Civil Procedure to the applicant or the holder of the permit, and a public hearing thereon, refuse to issue said license. And thirty days after the refusal of said commission to issue said license all rights of the applicant and the holder of the permit under said application and permit shall lapse and cease. But the holder of any permit to whom the said water commission may have refused to issue said license, shall have the right to bring an action within thirty days after the said refusal, in the superior court to review said order and to obtain a decree requiring the issuance of such license. And the rights of the holder of any permit so bringing an action shall continue under said permit until the decree in such action has been entered and become final. But until the refusal of the commission to issue said license shall be finally determined by the courts, the permittee shall not take or use any of the water, the taking and using of which is granted to him by said permit. And if the holder of any permit which has been revoked by the state water commission shall not bring an action within said thirty days in the superior court to determine the validity of said revocation, then and in that case all rights of the applicant and of the holder of said permit shall lapse and cease.

SEC. 20. All permits and licenses for the appropriation of water shall be under the terms and conditions of this act, and shall be effective for such time as the water actually appropriated under such permits and licenses shall actually be used for the useful and beneficial purpose for which said water was appropriated, but no longer; and every such permit or license shall include the enumeration of conditions therein which in substance shall include all of the provisions of this section and likewise the statement that any appropriator of water, to whom said permit or license may be issued, shall take the same subject to such conditions as therein expressed; *provided*, that if, at any time after the expiration of twenty years after the granting of a license, the state, or any city, city and county, municipal water district, irrigation district, lighting district, or any political subdivision of the state shall have the right to purchase the works and property occupied and used under

said license and the works built or constructed for the enjoyment of the rights granted under said license; and in the event that the said state, city, city and county, municipal water district, irrigation district, lighting district, or political subdivision of the state so desiring to purchase and the said owner of said works and property can not agree upon said purchase price, said price shall be determined in such manner as is now or may hereafter be determined in eminent domain proceedings. If it shall appear to the state water commission at any time after a permit or license is issued as in this act provided that the permittee or licensee, or the heirs, successors, or assigns of said permittee or licensee, has not put the water granted under said permit or license to the useful or beneficial purpose for which the permit or license was granted, or that the permittee or licensee, or the heirs, successors, or assigns of said permittee or licensee, has ceased to put said water to such useful or beneficial purpose, or that the permittee or licensee, or the heirs, successors or assigns of said permittee or licensee, has failed to observe any of the terms and conditions in the permit or license as issued, then and in that case the said commission, after due notice to the permittee, licensee, or the heirs, successors or assigns of such permittee or licensee, and a hearing thereon, may revoke said permit or license and declare the water to be unappropriated and open to further appropriation in accordance with the terms of this act. And the findings and declaration of said commission shall be deemed to be prima facie correct until modified or set aside by a court of competent jurisdiction; *provided,* that any action brought so to modify or set aside such finding or declaration must be commenced within thirty days after the service of notice of said revocation on said permittee or licensee, his heirs, successors or assigns. And every licensee or permittee under the provisions of this act if he accept such permit or license shall accept the same under the conditions precedent that no value whatsoever in excess of the actual amount paid to the state therefor shall at any time be assigned to or claimed for any permit or license granted or issued under the provisions of this act, or for any rights granted or acquired under the provisions of this act, in respect to the regulation by any competent public authority of the services or the price of the services to be rendered by any permittee or licensee, his heirs, successors or assigns or by the holder of any rights granted or acquired under the provisions of this act, or in respect to any valuation for purposes of sale to or purchase, whether through condemnation proceedings or otherwise, by the state or any city, city and county, municipal water district, irrigation district, lighting district or any political subdivision of the state, of the rights and property of any permittee or licensee, or the possessor of any rights granted, issued, or acquired under the provisions of this act. The application for a permit by municipalities for the use of water for said municipalities or the inhabitants thereof for domestic purposes shall be considered first in right, irrespective of whether they are first in time; *provided, however,* that such application for a permit or the granting thereafter of permission to any municipality to appropriate waters, shall not authorize the appropriation of any water for other than municipal purposes; *and providing, further,* that where permission to appropriate is granted by the state water commission to any

municipality for any quantity of water in excess of the existing municipal needs therefor, that pending the application of the entire appropriation permitted, the state water commission shall have the power to issue permits for the temporary appropriation of the excess of such permitted appropriation over and above the quantity being applied from time to time by such municipality; *and providing, further,* that in lieu of the granting of such temporary permits for appropriation, the state water commission may authorize such municipality to become as to such surplus a public utility, subject to the jurisdiction and control of the railroad commission of the state of California for such period or periods from and after the date of the issuance of such permission to appropriate, as may be allowed for the application to municipal uses of the entire appropriation permitted; *and provided, further,* that when such municipality shall desire to use the additional water granted in its said application it may so do upon making just compensation for the facilities for taking, conveying and storing such additional water rendered valueless for said purposes, to the person, firm or corporation which constructed said facilities for the temporary use of said excess waters, and which compensation, if not agreed upon between the municipality and said person, firm or corporation, may be determined in the manner provided by law for determining the value of property taken by and through eminent domain proceedings.

SEC. 21. Nothing herein contained shall be construed to deprive the state or any city, city and county, municipal water district, irrigation district, lighting district or political subdivision of the state, or any person, company or corporation of any rights which, under the law of this state they may have, to acquire property by or through eminent domain proceedings.

SEC. 22. Licenses hereafter granted for water or use of water shall be subject to the right of the state to impose the fees and charges provided in this act.

SEC. 23. Every person, firm, association or corporation making application for a permit to appropriate water or the use of water under this act shall pay to the state water commission, at the time of filing said application, if the purpose or use is for the generation of electricity, or electrical or other power, a fee of two dollars and fifty cents for each theoretical horsepower capable of being developed by the works up to one hundred theoretical horsepower, with a minimum fee of twenty-five dollars, and above said one hundred theoretical horsepower the fee shall be five hundred dollars up to and including ten thousand theoretical horsepower, and one thousand dollars above ten thousand theoretical horsepower capable of being so developed or a fee of ten dollars if the purpose be other than for the generation of electricity, or electrical or other power. Every person, firm, association or corporation at the time of receiving a license to appropriate water or the use of water, if the purpose be for the generation of electricity, or electrical or other power, shall pay to said commission when the said license is issued, and annually thereafter, a charge of twenty-five cents for each theoretical horsepower capable of being developed by the proposed works. If the purpose of use is for other than the generation of electricity, or electrical or other power, every person, firm, association or corporation receiving a license to appropriate water shall pay to the said commission when said license is issued, and nnually thereafter, a charge of ten cents per miner's inch for each

miner's inch specified in the license, and for the purpose of this act forty miner's inches shall be equivalent to one cubic foot per second; *provided, however,* that no annual charge shall be made when the appropriation is made for use for irrigation purposes upon lands, not exceeding one hundred and sixty acres in area to be actually occupied by such appropriator and cultivated in whole or in part by him, or when said water is used for mining purposes, and the amount of water so used for such mining purposes does not exceed five hundred miner's inches, or when the water is used for the generation of power when the same does not exceed fifty horsepower and is for the private use of the appropriator. And all such fees and charges shall forthwith be paid into the state treasury by the state water commission, and the fee and annual charges provided in this section shall be subject to change by law at not less than ten year intervals beginning with the date of the license issued by the state water commission.

SEC. 24. Upon its own initiative or upon petition signed by one or more claimants to water or the use of water upon any stream, stream system, lake, or other body of water, requesting the ascertainment of the relative rights of the various claimants to the water or the use of water of that stream, stream system, lake or other body of water, it shall be the duty of the state water commission, if, upon investigation it finds the facts and conditions are such as to justify, to make an ascertainment of the said rights, fixing a time for the beginning of the taking of testimony and the making of such investigation as will enable it to ascertain the rights of the various claimants. In case suit is brought in the superior court for determination of rights to water or the use of water, the case may, in the discretion of the court, be transferred to the state water commission for investigation, as referee. In any case wherein the water commission shall proceed to investigate or ascertain water rights the said commission shall notify in writing in the manner provided in sections one thousand and eleven, one thousand and twelve and one thousand and thirteen of the Code of Civil Procedure all persons, firms, associations or corporations claiming or possessing any water rights which are to be the subject of ascertainment by the said commission.

SEC. 25. Upon the completion of the taking of testimony and evidence by the state water commission, the said commission shall immediately give notice by registered mail to the various claimants or possessors of water rights that, at a date and place named in the said notices, which date shall not be less than fifteen days nor more than thirty days later than the date of said notice, all of said testimony and evidence will be open to public inspection. And said testimony and evidence shall be held open to public inspection at said places for a specified period of not less than thirty days nor more than ninety days, and thereafter the said commission shall cause its findings and ascertainment of the rights of the respective claimants to said water to be made and filed in the superior court in each of the counties where said water is appropriated.

SEC. 26. If any person, firm, association or corporation claiming or possessing any interest in or right to the waters of any stream, stream system, lake or other body of water involved in any investigation or ascertainment by the state water commission of the rights to the water of said stream, stream system, lake or other body of water, desires to

contest any of the interests in or rights to any of the said waters of any other person, firm, association or corporation such person, firm, association or corporation desiring so to contest shall, within ten days after the expiration of the period for public inspection prescribed in section twenty-five of this act, notify, in writing, the state water commission of said desire so to contest. Said notice shall state the ground of contest, which shall be verified by the oath of the contestant, his agent or attorney. Within ten days of the receipt of the notice of contest the state water commission shall notify the contestant and the person, firm, association or corporation whose rights are contested to appear before it at a time and place specified in said notice, and that at said time and place said contest will be heard; *provided,* that said time shall not be less than thirty days nor more than sixty days from the date of the service of the notice of the commission; *provided, further,* that if any person, firm, association or corporation desires to contest any such ascertainment by the state water commission as hereinbefore provided, such contest may be brought as provided in sections thirty-one and thirty-two hereof.

SEC. 27. Said notice by said water commission shall be served and return made thereon in the same manner in which summons and return thereon are made in civil actions in the superior courts of this state. The water commission shall have power to adjourn hearings of contest from time to time upon reasonable notice to all parties in interest, and to issue subpœnas for and compel the attendance of witnesses to testify before it and produce papers, books, maps and other documents.

SEC. 28. The state water commission shall require from the party bringing the contest before it under section twenty-six of this act a deposit of five dollars for each day it shall be engaged in taking testimony in such contest. Upon the final ascertainment by the state water commission in any contest, the said commission shall enter an order directing the return of the deposit to the depositor if the contest shall be determined in his favor, but, if the contest shall be determined against the person bringing it, the said deposit shall be immediately paid into the state treasury.

SEC. 29. Not less than fifteen days nor more than thirty days after the expiration of the period during which the testimony and evidence is to be kept open for public inspection, or if any contest shall be made, not less than fifteen days nor more than thirty days after the settlement of said contest by the water commission, the testimony and evidence in the original hearing and the testimony and evidence taken in said contest shall be filed in the office of the water commission.

SEC. 30. The water commission may, in its discretion and in addition to the testimony and evidence submitted to it by the parties claimant to or possessors of water rights on any stream, stream system, lake or other body of water cause to be made an examination of said stream, stream system, lake or other body of water and the works diverting or utilizing water therefrom. Said examination may include the gathering of whatever data covering said stream, stream system, lake or other body of water and the various ditches and canals taking water therefrom as the said commission may require, as well as such other data and information as may, in the discretion of the said commission, be necessary to enable it properly to ascertain the relative rights of the parties claiming rights to use the waters of said stream, stream system, lake,

or other body of water. The results of said examination shall be filed in the office of said commission and be open to public inspection as provided in this act for the filing and public inspection of other evidence of a like nature.

SEC. 31. As soon as practicable after the hearing of testimony and evidence, the hearing of contest, and the gathering and filing of such data and information as the water commission shall, of its own motion, direct to be gathered, the said water commission shall record in its office its ascertainment of and specific findings upon the rights of the several claimants to the use of the waters of any stream, stream system, lake or other body of water. Immediately thereafter, the said water commission shall file a certified copy of said ascertainment and specific findings together with the original evidence and testimony taken before it and all data and information gathered by its order with the clerk of the superior court in and for the county in which such stream, stream system, lake or other body of water or any part thereof is situated.

SEC. 32. After the filing with the clerk of the superior court of the evidence, data, information, specific findings and ascertainment as required by section thirty-one of this act, the same shall be received in the superior court as prima facie evidence of the facts, specific findings and ascertainment therein set forth. And at any time within one year after such filing an action may be brought, upon the direction of the state water commission, by the attorney general in said superior court in which said evidence, data, information, specific findings and ascertainment shall have been so filed. Or an action may be brought in said court by any one or more of the possessors or claimants concerning whose rights to any of the waters of the stream, stream system, lake or other body of water the state water commission shall have made the specific findings and ascertainment filed in said court. Said action if brought by the attorney general shall be brought in the name and behalf of the people of the state of California to quiet the title of the state of California or the people thereof to any and all water or water rights which it may have in or on said stream, stream system, lake or other body of water, and, to cause all parties whose rights have been so ascertained to appear and interplead in said action in defense and determination of each and all of their respective rights, which rights, as against the state and with regard to the different rights and priorities of said rights among themselves, shall be determined by the court in said action. And if an action be brought by any one or more of said claimants or possessors, said action may be brought in the name of the said possessor or claimant and to cause all parties, whose rights have been ascertained, to appear and interplead in said action in defense and determination of each and all of their respective rights, which rights, as against the state or the people thereof, and with regard to the different rights and priorities of said rights among themselves shall be determined by the court in said action. And from and after the filing of the complaint in such action, the proceedings therein shall be as in other cases heard and determined in said court, and in accordance with the provisions of the Code of Civil Procedure of this state; *provided,* that the evidence, data, information, specific findings and ascertainment so filed with the superior court as provided in section thirty-one of this act must be considered by said court in its determination of both or either of said actions, and

the court may affirm, modify or reject such specific findings and ascertainment and may make other or different findings as in its judgment the evidence justifies.

SEC. 33. All existing lawful appropriations of water or the use thereof, shall be and hereby are respected and upheld to extent of the amount of water appropriated and actually put or in process of being put, from the initial date of the act of appropriation, with due diligence in proportion to the magnitude of the work necessary properly to utilize the water for the useful or beneficial purpose for which it was appropriated, or for which it is being used.

SEC. 34. Whenever proceedings shall be instituted for the ascertainment by the state water commission of rights to water or the use of water, it shall be the duty of all claimants interested therein and having notice thereof as in this act provided to appear and submit proof of their respective claims at the time and in the manner required by law; and any such claimant who shall fail to appear in such proceedings and submit proof of his claim shall be barred and estopped from subsequently asserting any rights theretofore acquired upon the stream, stream system, lake or other body of water, or portion of such stream, stream system, lake or other body of water, embraced in such proceedings, and shall be held to have forfeited all rights to said water or the use of water theretofore claimed by him on such stream, stream system, lake or other body of water, unless entitled to relief under the laws of this state; *provided*, that such proceedings shall result in an ascertainment by the state water commission and a decree by the superior court based upon such ascertainment and specific findings or a modification of said ascertainment or specific findings.

SEC. 35. In any suit wherein the state is or the people of the state are a party for the determination of a right to the use of the water of any stream, stream system, lake or other body of water, or of any portion of any stream, stream system, lake or other body of water, all who claim the right to use such water shall be made parties. When any such suit has been filed the court may call upon the state water commission to make or furnish a complete hydrographic survey of such stream, stream system, lake or other body of water, in order to obtain all the data necessary to the determination of the rights involved. The disbursements made in litigating the rights involved in such suit may be taxed by the court as in other equity suits, exclusive of the cost of such hydrographic survey.

SEC. 36. Upon the adjudication of the rights to the use of the water of a stream, or stream system, lake or other body of water, or any portion of a stream, stream system, lake or other body of water, a certified copy of the decree shall be prepared by the clerk of the court, without charge, and filed in the office of the state water commission, and said commission shall deliver to every party in such decree a certified copy thereof upon demand and the payment of the fees provided in this act. And the said commission shall file, for record, in the office of the recorder of each county in which any portion of said stream, stream system, lake or other body of water is situated, a certified copy of said decree. Said decree shall in every case declare as to the water right adjudged to each party, whether riparian or by appropriation, the extent, the priority, amount, purpose of use, point of diversion, and place of use of said water; and, as to water used for irrigation, such

decree shall also declare the specific tracts of land to which it shall be appurtenant together with such other conditions as may be necessary to define the right and its priority. But the failure of any party entitled thereto to demand or receive a copy of said decree shall not be considered to have prejudiced him or his rights in any way.

SEC. 37. The power to supervise the distribution of water in accordance with the priorities established under this act, when such supervision does not contravene the authority vested in the judiciary of the state, is hereby vested in the state water commission.

SEC. 38. The diversion or use of water subject to the provisions of this act other than as it is in this act authorized is hereby declared to be a trespass, and the state water commission is hereby authorized to institute in the superior court in and for any county wherein such diversion or use is attempted appropriate action to have such trespass enjoined.

SEC. 39. Water or the use of water which has heretofore been appropriated or acquired, or which shall hereafter be appropriated or acquired for one specific purpose, shall not be deemed to be appropriated or acquired for any other or different purpose. And any person, firm, association or corporation applying to the state water commission for a license to appropriate water or the use of water shall state in the application for said license the specific purpose to which it is proposed to put such water or the use thereof. Water heretofore or hereafter appropriated for other than domestic use, may be applied to domestic use, in whole or in part, without a separate and distinct appropriation being made therefor. And water appropriated for one purpose under the provisions of this act may be subsequently appropriated for other purposes under the provisions of this act; *provided,* that such subsequent appropriation shall not injure any previous appropriation.

SEC. 40. The state water commission is also authorized and empowered to investigate any natural situation available for reservoirs or reservoir systems for gathering and distributing flood or other waters not under beneficial use in any stream, stream system or lake or other body of water, and to ascertain the feasibility of such projects, including the supply of water that may thereby be made available, the extent and character of the areas that may be thereby irrigated, and make estimate of the cost of such project.

SEC. 41. Nothing in this act shall be construed as depriving any city, city and county, municipal water district, irrigation district or lighting district of the benefit of any law heretofore or hereafter passed for their benefit in regard to the appropriation or acquisition of water or the use of water; and nothing in this act shall affect or limit in any manner whatsoever the right or power of any municipality which has heretofore appropriated or acquired water or the use of water for municipal purposes, to use or to sell or otherwise dispose of such water or the use thereof, either within or without its limits for domestic, irrigation or other purposes, in accordance with laws in effect at the time of the passage of this act.

SEC. 42. The word "water" in this act shall be construed as embracing the term "or use of water"; and the term "or use of water" in this act shall be construed as embracing the word "water." Whenever the terms stream, stream system, lake or other body of water or water occurs in this act, such term shall be interpreted to refer only to surface

water, and to subterranean streams flowing through known and definite channels. But nothing in this act shall be construed as giving or confirming any right, or title, or interest to or in the corpus of any water; *provided,* that the term "useful or beneficial purposes" as used in this act shall not be construed to mean the use in any one year of more than two and one-half acre feet of water per acre in the irrigation of uncultivated areas of land not devoted to cultivated crops.

SEC. 43. Nothing in this act shall be construed as depriving any person, firm, association or corporation of the right of appeal conferred under the laws of this state.

SEC. 44. All acts or parts of acts in conflict herewith are hereby repealed.

SEC. 45. This act shall be known as the "water commission act."

SEC. 46. If any section, subsection, sentence, clause or phrase of this act is for any reason held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this act. The legislature hereby declares that it would have passed this act, and each section, subsection, sentence, clause and phrase thereof, irrespective of the fact that any one or more other sections, subsections, sentences, clauses or phrases be declared unconstitutional.

# NEEDED CHANGES.

## PROPOSED AMENDMENTS TO THE WATER COMMISSION ACT.

### DETERMINATION OF RIGHTS.

SECTION 1. In case suit is brought in the superior court for determination of rights to water or the use of water, the case may in the discretion of the court, be transferred to the state water commission for investigation, as referee.

SEC. 2. Upon its own initiative or upon petition signed by one or more claimants to water or the use of water upon any stream, stream system, lake, or other body of water (all of which sources of supply are hereinafter referred to as "stream system"), requesting the determination of rights, based upon prior appropriation, of the various claimants to the water of that stream system, it shall be the duty of the state water commission, if, upon investigation it finds the facts and conditions are such as to justify, to enter an order granting said petition and to make proper arrangements to proceed with such determination.

SEC. 3. As soon as practicable after the state water commission shall make and enter the order granting the said petition or selecting the stream system upon which the determination of water rights by appropriation is to begin, it shall prepare a notice setting forth the fact of the entry of said order and of the pendency of the said proceedings, the date when the state water commission shall begin said examination, and that all claimants to rights by appropriation of the waters of said stream system are required, as in this act provided, to make proof of their claims. The notice shall be published for a period of four consecutive weeks in one or more newspapers of general circulation published in each county in which any part of said stream system is situated.

SEC. 4. At the time set in said notice, the state water commission shall begin an investigation of the flow of the stream system and of the conduits diverting water, and of the lands irrigated or irrigable therefrom, and shall gather such other data and information as may be essential to the proper determination of the water rights by appropriation. It shall reduce its observations and measurements to writing. It shall execute surveys and shall prepare maps from the observations of such surveys in accordance with such uniform rules and regulations as it may adopt; which surveys and maps shall show with substantial accuracy the course of the stream or streams; the location of each conduit diverting water therefrom, land irrigated and capable of being irrigated by each conduit and the kind of culture upon the irrigated land. The maps shall be prepared as the surveys and observations progress, and, when completed, they shall be filed and made of record in the office of the state water commission.

SEC. 5. Upon the completion of such measurements and maps, the state water commission shall prepare a notice setting forth the date, prior to which the proofs (to be furnished by claimants upon forms

supplied by the state water commission and more specifically referred to in the next section hereof) as to the rights by appropriation of the waters of said stream system, shall be filed; *provided, however,* that the date set, prior to which said proofs must be filed, shall not be less than sixty days from the date of the last publication of said notice as hereinafter provided. The notice shall be deemed to be an order of the state water commission as to its contents, and it shall be published by the state water commission for a period of four consecutive weeks in one or more newspapers of general circulation published in each county in which any part of said stream system is situated. At or near the time of the first publication of said notice it shall be the duty of the state water commission to send by registered mail to each claimant to rights by appropriation of the waters of said stream system, in so far as such claimant can be reasonably ascertained at his last known place of address, a notice equivalent in terms to the said published notice.

SEC. 6. The state water commission shall, in addition, enclose with the notice to be mailed as aforesaid, blank forms (proofs of appropriation) upon which said claimant shall present in writing all particulars necessary for the determination of his right by appropriation of the waters of said stream system, the said statement to include the following:

(*a*) The name and post office address of the claimant.
(*b*) The nature of the right or use on which the claim for appropriation is based.
(*c*) The date of the initiation of such right and a description of works of diversion and distribution.
(*d*) The date of beginning of construction.
(*e*) The date when completed.
(*f*) The dates of beginning and completion of enlargements.
(*g*) The dimensions of the ditch as originally constructed and enlarged
(*h*) The date when water was first used for irrigation or other beneficial purposes, and if used for irrigation, the amount of land irrigated the first year, the amount in subsequent years, with the dates of irrigation and the area and the location of the lands which are intended to be irrigated.
(*i*) The character of the soil and the kind of crops cultivated, and such other facts as will show the extent and nature of the right and a compliance with the law in acquiring the same, as may be required by the state water commission. Each claimant shall be required to certify to his statements, under oath.

SEC. 7. After the date fixed for the filing of proofs, no proofs shall be received or filed with the state water commission; *provided, however,* that the state water commission may, for cause shown, in its discretion, extend the time in which proofs may be filed. Upon neglect or refusal of any person to make proof of his claim to rights by appropriation of the waters of such stream system, as required by this act, prior to the expiration of the period fixed by the state water commission, during which proofs may be filed, the state water commission shall determine the right by appropriation of such person on such evidence as it may

obtain or may have on file in its office in the way of maps, plats, surveys and transcripts; and exceptions to such determination may be filed in court as hereinafter provided.

SEC. 8. Any claimant of a right by appropriation of the water of any stream system upon whom no service of notice shall have been had of the pendency of proceedings for the determination of the rights by appropriation of the waters of said stream system, and who shall have had no actual knowledge or notice of the pendency of said proceedings, may at any time prior to the expiration of three (3) months after the entry of the determination of the state water commission, as provided in section thirteen of this act, file a petition to intervene in said proceedings. Such petition shall be under oath and shall contain, among other things, all matters required by this act of claimants who have been duly served with notice of said proceedings, and also a statement that the intervenor had no actual knowledge or notice of the pendency of said proceedings. Upon the filing of said petition in intervention, the petitioner shall be allowed to intervene and thereafter shall have all the rights and be subject to all the duties of the claimants who have been duly served.

SEC. 9. At the time of submission of proof of appropriation, the state water commission shall collect from such claimants, on the basis of the statements in the proofs, a fee of fifteen (15) cents for each acre of irrigated or irrigable lands up to and including one hundred (100) acres, ten (10) cents for each acre in excess of one hundred (100) acres and up to and including one thousand (1,000) acres, and five (5) cents per acre for each acre in excess of one thousand (1,000) acres; also twenty-five (25) cents for each theoretical horsepower up to and including one hundred (100) horsepower, fifteen (15) cents for each theoretical horsepower in excess of one hundred (100) horsepower and up to and including one thousand (1,000) horsepower, and five (5) cents for each theoretical horsepower in excess of one thousand (1,000) horsepower; also five (5) dollars for each cubic foot per second, or fraction thereof, claimed for any purpose other than irrigation or power; the minimum fee, however, for any claimant to be five (5) dollars. All fees charged and collected under this section shall be paid, at least once each month, accompanied by a detailed statement thereof, into the treasury of the state.

SEC. 10. As soon as practicable after the expiration of the period fixed in which proofs may be filed, the state water commission shall assemble all proofs which have been filed, and prepare and certify an abstract of all of the said proofs, which shall be printed in the state printing office. As soon as practicable the state water commission shall prepare a notice fixing and setting a time and place, reasonably convenient to the claimants, when and where the evidence taken by or filed with it shall be open to the inspection of all interested persons, said period of inspection to be not less than ten (10) days, which notice shall be deemed to be an order of the state water commission as to the matters contained therein. A copy of said notice together with a printed copy of the said abstract of proofs shall be sent by registered mail, at least fifteen (15) days prior to the first day of such period of inspection, to each claimant who has appeared and filed proof as herein provided. A representative of the state water commission shall be present at the

time and place designated in said notice, and allow, during said period, any person interested to inspect such evidence and proofs as have been filed in accordance with this act.

SEC. 11. Should any claimant desire to contest any of the statements and proofs of claims filed with the state water commission by any other claimant to the waters of the stream system, he shall, within fifteen (15) days after said evidence and proofs shall have been opened to public inspection, or within such further time as for good cause shown may be allowed by the state water commission upon application made prior to the expiration of said fifteen (15) days, in writing notify the state water commission, stating with reasonable certainty the grounds of the proposed contest, which statement shall be verified by the affidavit of the contestant, his agent or attorney. The statements or proofs of the person whose rights are contested and the verified statement of the contestant shall be deemed sufficient to constitute a proper cause for such contest.

SEC. 12. Within ten (10) days after the receipt of the notice of contest the state water commission shall notify by registered mail the contestant and the claimant whose rights are contested to appear before it at a time and place specified in said notice, and that at said time and place said contest will be heard; *provided,* that said time shall not be less than fifteen (15) days nor more than sixty (60) days from the date of the mailing of the notice of the commission. The state water commission shall have power to adjourn hearings of contests from time to time upon reasonable notice to all parties in interest, and to issue subpenas for and compel the attendance of witnesses to testify before it and to produce papers, books, maps and other documents. The costs of taking testimony at a hearing shall be borne by the parties thereto as follows: each party shall pay for the direct examination of his own witness and the cross-examination of opponent's witness and shall share equally for that part of the examination directed by the representative of the commission. One copy of the transcript of testimony taken at the hearing shall be furnished to the commission and the cost thereof borne equally by the parties.

SEC. 13. As soon as practicable after the hearing of contests it shall be the duty of the state water commission to make, and cause to be entered of record in its office an order determining and establishing the several rights by appropriation of the waters of said stream; *provided, however,* that within sixty (60) days after the entry of an order establishing water rights, the state water commission may, for good cause shown, reopen the proceedings and grant a rehearing. Such order and determination shall be prepared, and after certification by the state water commission, printed in the state printing office. A copy of said order of determination shall be sent by registered mail to each person who has filed proof of claim, and to each person who has become interested through intervention or as a contestant under the provisions of section eight or section eleven of this act.

SEC. 14. As soon as practicable, after the entry of the order of determination a certified copy thereof, together with the original evidence and transcript of testimony filed with, or taken before the state water commission, as aforesaid, duly certified by it, shall be filed with the clerk of the superior court of the county in which said stream system, or any part thereof, is situated. Upon the filing of the certified

copy of said order, evidence, and transcript with the clerk of the court in which the proceedings are to be had, the state water commission shall procure an order from said court setting a time for hearing. The clerk of such court shall immediately furnish the state water commission with a certified copy of said order. It shall be the duty of the state water commission immediately thereupon to mail a copy of such certified order of the court, by registered mail, addressed to each known party in interest at his last known place of residence, and to cause the same to be published at least once a week for four consecutive weeks in some newspaper of general circulation published in each county in which such stream system or any part thereof is located, and the state water commission shall file with the clerk of the court proof of such service by registered mail and by publication. Such service by registered mail and by publication shall be deemed full and sufficient notice to all parties in interest of the date and purpose of such hearing.

SEC. 15. At least ten (10) days prior to the day set for hearing all parties in interest who are aggrieved or dissatisfied with the order of determination of the state water commission shall file with the clerk of said court notice of exceptions to the order of determination of the state water commission, which notice shall state briefly the exceptions taken, the reasons therefor, and the prayer for relief, and a copy thereof shall be transmitted by registered mail at least ten (10) days prior to such hearing, to the state water commission and to each claimant, who was an adverse party to any contest wherein such exceptor was a party in the proceedings. The order of determination by the state water commission and the statements or claims of claimants and exceptions made to the order of determination shall constitute the pleadings and there shall be no other pleadings in the cause. If no exceptions shall have been filed with the clerk of the court as aforesaid, then on the day set for the hearing, on motion of the state water commission, or its attorney, the court shall enter a decree affirming said order of determination. On the day set for hearing all parties in interest who have filed notices of exceptions as aforesaid shall appear in person or by counsel and it shall be the duty of the court to hear the same or set the time for hearing, until such exceptions are disposed of, and all proceedings thereunder shall be as nearly as may be in accordance with the rules governing civil actions.

SEC. 16. For further information on any subject in controversy the court may employ one or more qualified persons to investigate and report thereon under oath, subject to examination by any party in interest as to his competency to give expert testimony thereon. The court may, if necessary, refer the case for such further evidence to be taken by the state water commission as it may direct, and may require a further determination by it. After the hearing, the court shall enter a decree affirming or modifying the order of the state water commission. Said decree shall in every case declare as to the water right by appropriation adjudged to each party, the extent, priority, amount, purpose of use, point of diversion, and place of use of said water; and as to water used for irrigation, such decree shall also declare the specific tracts of land to which it shall be appurtenant together with such other conditions as may be necessary to define the right and its priority. Upon the hearing the court may assess and

adjudge against any party such costs as it may deem just. Appeals from such decree may be taken to the supreme court by the state water commission or any party in interest, in the same manner and with the same effect as in civil cases.

SEC. 17. A certified copy of the decree of the superior court shall be prepared by the clerk thereof, without charge, and filed for record in the office of the county recorder of each county in which any part of the stream system is situated and also in the office of the state water commission. It shall be the duty of the state water commission to issue to each claimant represented in such determination a certificate to be signed by the president of the state water commission, and attested under seal by the secretary of said commission, setting forth the name and post office address of the owner of the right; the priority of the date, extent and purpose of such right; and if such water be for irrigation purposes, a description of the legal subdivisions of land to which said water is appurtenant.

SEC. 18. Whenever proceedings shall be instituted for the determination by the state water commission of rights by appropriation of water, it shall be the duty of all claimants interested therein and having notice thereof as in this act provided to appear and submit proof of their respective claims at the time and in the manner required by law; and any such claimant who shall fail to appear in such proceedings and submit proof of his claim shall be barred and estopped from subsequently asserting any rights theretofore acquired upon the stream system, embraced in such proceedings, and shall be held to have forfeited all rights by appropriation to said water theretofore claimed by him on such stream system, unless entitled to relief under the laws of this state; *provided,* that such proceedings shall result in a determination by the state water commission and a decree by the superior court confirming or modifying said determination. Such decree shall be conclusive as to the rights by appropriation of all existing claimants upon the stream system lawfully embraced in the determination.

SEC. 19. The state water commission shall have authority and power in making a determination as to the rights by appropriation of the waters of any stream system, to fix a time limit for the completion of all appropriations of water from such stream, where such rights of appropriations were initiated prior to December 19, 1914, and since prosecuted with reasonable diligence; and such appropriators having been duly notified as provided in this act, must appear and submit their proofs of claim, or they shall be deemed and held to be in default, and to have abandoned or to have no right, title or interest in or to the waters of such stream. In determining rights of such appropriators the state water commission shall prescribe such a reasonable time for the completion of such appropriations, and the application of the water appropriated to a beneficial use, as will enable such appropriators acting in good faith and with due diligence to complete the same. The findings of the state water commission shall provide for the submission of proof or evidence as to the completion of such appropriation and the amount of water actually applied to beneficial use, upon the expiration of such time limit, and shall, in accordance with such proof, enter supplemental findings, establishing and determining such rights of appropriation, in so far as the same shall have been completed; and certificates of water right shall be issued in accordance with such supplemental findings and order of determination

of said commission, but this section shall not be construed to confer any rights of appropriation upon parties who shall have abandoned their said appropriations or failed to use due diligence in the application of the water to a beneficial use and in the completion of their appropriations, and all such appropriators, who shall fail to complete their said appropriations within the limit of time fixed by the state water commission in said findings, or such further time granted upon application made prior to the expiration of such time limit, as the state water commission shall find equitable and just, shall be deemed to have abandoned their rights of appropriation, and rights acquired by virtue thereof waived, and such appropriators shall be deemed and held to have no right, title or interest in or to the waters of such stream by virtue of their said appropriations.

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## AN ACT

*An act to amend an act known as the "Water Commission Act," approved June 16, 1913, amending section thirty-seven thereof and adding thereto five new sections, to be numbered thirty-seven a, thirty-seven b, thirty-seven c, thirty-seven d, thirty-seven e, relating to the distribution of water and providing for the appointment of water masters, and defining their duties.*

*The people of the State of California do enact as follows:*

SECTION 1. Section thirty-seven of an act known as the "Water Commission Act," approved June 16, 1913, is hereby amended to read as follows:

37. The state water commission shall divide the state into water districts to be so constituted and adjusted as to insure the most practical and economical supervision of the distribution of water on the part of the state. Said water districts shall not be created until a necessity therefor shall arise and shall be created and changed from time to time as the claims to water shall require.

SEC. 2. A new section is hereby added to said act, to be numbered section thirty-seven *a*, and to read as follows:

37*a*. One or more water masters for each water district shall be appointed by the state water commission. The water master shall be properly qualified and shall perform the duties imposed on him by this act as an employee under the general supervision and control of the state water commission. It shall be the duty of the water master to divide the waters of the streams, or other sources of supply, among the several conduits, ditches, pipe lines and other means of diversion (all of which are hereinafter referred to as conduits) and reservoirs taking water therefrom, according to the rights of the water users as fixed by the permits or licenses issued by the state water commission or the adjudications of the courts, and to so adjust or close the headgates of conduits and regulate the controlling works of reservoirs, as may be necessary to insure a proper distribution of the water thereof among the water users entitled to its use. Whenever in the pursuance of his duties the water master regulates a headgate to a conduit or the controlling works of reservoirs, it shall be his duty to attach to such headgate or controlling works a written notice properly dated and signed, setting forth the fact that such headgate or controlling works has been properly regulated and is wholly under his control and such notice shall be a

legal notice to all parties interested in the diversion and distribution of the water of such conduit or reservoir.

SEC. 3. A new section is hereby added to said act, to be numbered section thirty-seven *b*, and to read as follows:

Sec. 37*b*. Any person who shall wilfully and without authority open, close, change or interfere with any headgate, waterbox or measuring device while under the control of the water master, or who shall wilfully take or use water which has been denied him by the water master under the provisions of this act, shall be deemed guilty of a misdemeanor. The possession or use of water when the same shall have been so denied him by the water master shall be prima facie evidence of guilt of the person using it.

SEC. 4. A new section is hereby added to said act, to be numbered section thirty-seven *c*, and to read as follows:

Sec. 37*c*. The owner of any conduit shall construct and maintain to the satisfaction of the state water commission a substantial and serviceable headgate or diversion works, at or near the point where the water is diverted, which shall be of such construction that it can be locked and kept closed by the water master; and such owner shall construct and maintain, when required by the state water commission, suitable measuring devices at such points along such ditch as may be necessary for the purpose of assisting the water master in determining the amount of water that is to be diverted into said conduit from the stream. Any and every owner or manager of a reservoir located across or upon the bed of a natural stream or of a reservoir which requires the use of a natural stream channel, shall construct and maintain, when required by the state water commission, a measuring device of a plan to be approved by the state water commission, below such reservoir, and a measuring device above such reservoir, on each or every stream or source of supply discharging into such reservoir, for the purpose of assisting the state water commission or water master in determining the amount of water to which appropriators are entitled and thereafter diverting it for such appropriators' use. If any such owner or owners of water works shall refuse or neglect to construct and put in such headgates or measuring devices after thirty (30) days notice, the water master may close such ditch, and the same shall not be opened or any water diverted from the source of supply, under the penalties prescribed by law for the opening of headgates lawfully closed until the requirements of the state water commission as to such headgates or measuring device have been complied with, and if any owner or manager of a reservoir located across the bed of a natural stream, or of a reservoir which requires the use of a natural stream channel, shall neglect or refuse to put in such measuring devices after thirty (30) days notice by the state water commission, the water master may open the sluicegate or outlet of such reservoir and the same shall not be closed except by order of the state water commission, under the penalties of the law for changing or interfering with headgates, until the requirements of the state water commission as to such measuring devices are complied with.

SEC. 5. A new section is hereby added to said act, to be numbered section thirty-seven *d*, and to read as follows:

Sec. 37*d*. The water master shall have the power to arrest any person violating any of the provisions of sections thirty-seven *b* and thirty-seven *c* of this act, and to give him into the custody of the sheriff, or

other competent police officer within the county, and immediately thereafter make complaint before a magistrate against the person so arrested.

SEC. 6. A new section is hereby added to said act, to be numbered section thirty-seven *e*, and to read as follows:

Sec. 37*e*. Any person violating any of the provisions of sections thirty-seven *b* and thirty-seven *c* of this act shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined in a sum not less than twenty-five (25) dollars, nor more than two hundred fifty (250) dollars, or imprisoned in the county jail not less than ten (10) days nor more than six (6) months or by both such fine and imprisonment.

*An act to amend an act, known as the "Water Commission Act," approved June 16, 1913, by amending section fifteen thereof, relating to the appropriation of water.*

*The people of the State of California do enact as follows:*

SECTION 1. Section fifteen of an act known as the "Water Commission Act," approved June 16, 1913, is hereby amended to read as follows:

15. The state water commission shall allow, under the provisions of this act, the appropriation for beneficial purposes of unappropriated water unless, in the opinion of the said commission, such appropriation would be detrimental to the public welfare.

*An act to amend an act known as the "Water Commission Act," approved June 16, 1913, by amending section twenty-three thereof, relating to fees to be collected by the state water commission.*

*The people of the State of California do enact as follows:*

SECTION 1. Section twenty-three of an act known as the "Water Commission Act," approved June 16, 1913, is hereby amended to read as follows:

23. Every person, firm, association or corporation making application for a permit to appropriate water or the use of water under this act shall pay to the state water commission, at the time of filing said application, a filing fee in the sum of five (5) dollars and, upon the issue of a permit, the additional fee, if the purpose or use is for the generation of electricity or electrical or other power, of ten (10) cents for each theoretical horsepower capable of being developed by the works up to and including one hundred (100) theoretical horsepower, of five (5) cents for each horsepower in excess of one hundred (100) theoretical horsepower up to and including one thousand (1,000) theoretical horsepower, and of one (1) cent for each theoretical horsepower in excess of one thousand theoretical horsepower; also, if for agricultural purposes, of five (5) cents for each acre of land to be irrigated by means of said appropriation to and including one hundred (100) acres, of three (3) cents per acre for each acre in excess of one hundred (100) acres up to and including one thousand (1,000) acres, and of two (2) cents for each acre over one thousand (1,000) acres. All fees shall forthwith be paid into the state treasury by the state water commission. No fee shall be required from any person, firm, association, or corporation exempt by any law of the State of California from the payment of such fee.

# REASONS FOR CHANGES

## DISCUSSION OF THE NECESSITY OF THE FOREGOING PROPOSED AMENDMENTS.

By L. D. BOHNETT, Attorney for the Commission.

The Water Commission Act in its present form fails to provide all of the machinery necessary to accomplish the full purpose of the act. Its operation for a period of two years has shown weaknesses, to correct which the State Water Commission has prepared the foregoing amendments, which it recommends to the legislature in the firm belief that their enactment is essential to the proper and efficient control and administration of the water of the state.

### DETERMINATION OF RIGHTS.

One of the principal objects sought in the enactment of the law was the prevention of a great amount of litigation over water and water rights. This was to be accomplished by providing (Sec. 24 et seq.) that the State Water Commission should, upon its own initiative or upon petition of interested parties, ascertain the several rights of all claimants to the water or use of water of any stream, stream system, lake, or other body of water. The findings and conclusions of the commission, after being filed in the proper court and confirmed by its judgment, would finally determine in one proceeding rights which, without such a procedure, would be settled only by a large number of expensive and vexatious suits.

As the law stands today, however, the procedure for the determination of rights to the use of water is incomplete, indefinite, and otherwise unsatisfactory. In a number of the neighboring states this method of determination of rights to the use of water through the agency of a state commission has been practiced for a number of years and a procedure has there been developed which has proved satisfactory and economical and has withstood all attacks in the courts. The proposed amendment relating to this question has been prepared by adapting the provisions of the tried and effective laws of Oregon and Nevada, which have been found to work well in practice and have been approved by the court of last resort.

In upholding the Oregon statute upon this subject, the Supreme Court of the United States, in the case of *Pacific Live Stock Company* vs. *Lewis et al* (June 5, 1916), said:

"* * * A general outline of the statute, as it has been construed by the Supreme Court of the state, will serve to simplify the questions to be considered. It recognizes that in Oregon rights to use the waters of streams for irrigation and other beneficial purposes may be acquired

by appropriation, adopts a comprehensive scheme for securing an economical, orderly and equitable distribution of the waters among those entitled to their use, incidentally prescribes a mode of determining the relative rights of the various claimants to the waters of each stream, and in large measure commits the administration of the scheme to the State Water Board and officers acting under the supervision of its members. When one or more users of water from any stream request it the board, if finding that the conditions justify it, is required to set in motion a proceeding looking to an ascertainment and adjudication of all rights to the waters of that stream. Every material step in the proceeding is to be attended with notice and an opportunity to be heard, the adequacy of which is manifest. * * * The board is then to examine all the evidence, make findings of fact therefrom, enter an order embodying the findings and provisionally determining the relative rights of the several claimants, and transmit the evidence and a copy of the order to the circuit court of the county wherein the stream or some part of it lies. Exceptions to the board's findings and order may be presented to the court and in disposing of them the court is to follow as near as may be the practice prevailing in suits in equity. All parties in interest, including the board as representing the state, are to be fully heard. Further evidence may be taken by the court, or the matter may be remanded with directions that additional evidence be taken and that the matter be again considered by the board, in which event the evidence and a copy of the further order of the board are to be transmitted to the court as in the first instance. In short, upon exceptions the court may re-examine the whole matter and enter such decree as the law and the evidence may require, whether it be an affirmance or a modification of the board's order. And even where no exceptions are presented a decree giving effect to the order is to be entered, that is to say, the matter is not to be left as if the order in itself constituted an effective adjudication.

"* * * All claimants are required to appear and prove their claims; no one can refuse without forfeiting his claim, and all have the same relation to the proceeding. It is intended to be universal and to result in a complete ascertainment of all existing rights to the end, first, that the waters may be distributed, under public supervision, among the lawful claimants according to their respective rights without needless waste or controversy; second, that the rights of all may be evidenced by appropriate certificates and public records, always readily accessible, and may not be dependent upon the testimony of witnesses with its recognized infirmities and uncertainties, and, third, that the amount of surplus or unclaimed water, if any, may be ascertained and rendered available to intending appropriators.

"* * * In such a proceeding the rights of the several claimants are so closely related that the presence of all is essential to the accomplishment of its purposes, and it hardly needs statement that these can not be attained by mere private suits in which only a few of the claimants are present, for only their rights as between themselves could be determined. As against other claimants and the public the determination would amount to nothing. And so, upon applying the test before indicated, it is apparent that the assumed substantial identity between the proceeding and the pending suits does not exist.

"* * * As an alternative to its first contention, which we hold

untenable, the plaintiff insists that the statute is repugnant to the due process of law clause of the fourteenth amendment, first, because it requires a claimant, at his own expense, to assert and prove his claim before the board, and to pay an extortionate fee for having it considered—all under penalty of forfeiting his claim if he refuses—notwithstanding the board acts only administratively and its findings and order are not conclusive; second, because it permits the board to accept and act upon the sworn statements of claimants taken ex parte and upon the data set forth in the unsworn report of the engineer, without, as is asserted, affording any opportunity for showing their true value, or the want of it, by cross-examination or otherwise; and, third, because it requires that the board's findings and order, although only administrative in character, be followed and given effect in the distribution of the water pending the action of the circuit court upon them.

"A serious fault in this contention is that it does not recognize the true relation of the proceeding before the board to that before the court. They are not independent or unrelated, but parts of a single statutory proceeding, the earlier stages of which are before the board and the later stages before the court. In notifying claimants, taking statements of claim, receiving evidence and making an advisory report the board merely paves the way for an adjudication by the court of all the rights involved. As the Supreme Court of the state has said, the board's duties are much like those of a referee. (And see *Oregon R. R. & N. Co.* vs. *Fairchild,* 224 U. S. 510, 526–527.) All the evidence laid before it goes before the court, where it is to be accorded its proper weight and value. That the state, consistently with due process of law, may thus commit the preliminary proceedings to the board and the final hearing and adjudication to the court is not debatable. And so, the fact that the board acts administratively and that its report is not conclusive does not prevent a claimant from receiving the full benefit of submitting his claim and supporting proof to the board. That he is to do this at his own expense affords no ground for objection; on the contrary, it is in accord with the practice in all administrative and judicial proceedings. The fee alleged to be extortionate is a charge graduated according to the amount of land irrigated under the claim submitted, and is fifteen cents per acre for the first hundred acres, five cents per acre for the next nine hundred acres, and one cent per acre for any excess over one thousand acres. * * * In our opinion, the charge is not extortionate and its exaction is not otherwise inconsistent with due process of law.

"Upon examining the statute and the decisions of the Supreme Court of the state construing and applying it we are persuaded that it is not intended that the board shall accept and act upon anything as evidence that is devoid of evidential value or in respect of which the claimants concerned are not given a fair opportunity to show its true value, or the want of it, in an appropriate way. On the contrary, the statute discloses a fixed purpose to secure timely notice to all claimants of every material step in the proceeding and full opportunity to be heard in respect of all that bears upon the validity, extent, and priority of their claims. And while it is true, according to the concessions at the bar, that the sworn statements of claim are taken ex parte in the first instance, it also is true that they are then opened to public inspection, that opportunity is given for contesting them and that upon the hearing of the

contests full opportunity is had for the examination of witnesses, including those making the statements, and for the production of any evidence appropriate to be considered. Thus the fact that the original statements are taken ex parte becomes of no moment. And while it is true that the state engineer's report is accepted as evidence, although not sworn to by him, it also is true that the measurements and examinations shown therein are made and reported in the discharge of his official duties and under the sanction of his oath of office, and that timely notice of the date when they are to begin is given to all claimants. The report becomes a public document accessible to all and is accepted as prima facie evidence, but not as conclusive. * * * Considering the nature of the report and that claimants may oppose it with other evidence, it is plain that its use as evidence is not violative of due process. *Meeker & Co.* vs. *Lehigh Valley R. R. Co.*, 236 U. S. 412, 430.

"The provision that the water shall be distributed in conformity with the board's order pending the adjudication by the court has the sanction of many precedents in the legislation of congress and of the several states, notably in the provision in the Interstate Commerce Act directing that the orders of the commission shall be effective from a date shortly after they are made, unless their operation be restrained by injunction. These legislative precedents, while not controlling, are entitled to much weight, especially as they have been widely accepted as valid. Although containing no provision for an injunction, the statute under consideration permits the same result to be reached in another way, for it declares that the operation of the board's order 'may be stayed, in whole or in part' by giving a bond in such amount as the judge of the court in which the proceeding is pending may prescribe, conditioned for the payment of such damages as may accrue by reason of the stay. It is not, therefore, as if the requirements were absolute. As has been seen the order is made only after adequate notice and full opportunity to be heard, and when made is, with reason, deemed prima facie correct. It relates to flowing water, to the use of which there are conflicting claims. Unless diverted and used the water will pass on and be lost. No claimant is in possession and all assert a right to take from the common source. In this situation we think it is within the power of the state to require that, pending the final adjudication, the water shall be distributed, according to the board's order, unless a suitable bond be given to stay its operation. Such a requirement is not arbitrary, does not take from one and give to another and is not otherwise offensive to a right conception of due process."

The proposed amendment relative to the determination of rights limits the ascertainment by the commission to rights by appropriation. If the commission were to act under the existing procedure it would be necessary to ascertain all *riparian rights,* as well as rights by appropriation, and, as provided in sections 32 and 36, such ascertainment, if pushed to a conclusion, would result in a decree by the court defining the riparian rights as well as those by appropriation. On most California streams there are so many riparian tracts upon which water is not now used that the aggregate acreage is often sufficiently large to require more than the full flow of the stream for irrigation purposes.

These areas are confined to a comparatively narrow irregular strip so that they could not be economically included in one or more projects. Under present conditions an appropriator may make his diversion and in time secure a prescriptive right against such lower riparian owners. If, however, these riparian rights were defined, as provided for in the present Water Commission Act, the appropriations could not be made without purchasing such riparian rights, which purchase would render the project not feasible. It is, therefore, thought wise to limit the ascertainment to rights by appropriation.

Still another reason for the adoption of this amendment is that the present California procedure provides (section 32) for the filing of an entirely new action after the ascertainment has been completed by the commission. This not only would necessitate a great loss of time and money, but also would involve questions of constitutionality if, as is provided in the section, the Attorney General should bring the action "in the name and behalf of the people of the state of California to quiet the title of the state of California or the people thereof." A provision somewhat similar was declared unconstitutional by the Supreme Court of Idaho.

## DISTRIBUTION OF WATER.

An important part of the work of the State Water Commission should be the supervision of the distribution of the water of the state to those who are lawfully entitled to the use of such water. The owners of water rights will be greatly benefited by such supervision as it will insure delivery of the water to which they are entitled without frequent suits to enjoin interference with such delivery, and the state will be benefited not only by the decrease in litigation but also by the greater use that will be made of water if properly distributed. The only practicable way to insure such distribution appears to be through supervision by an administrative board such as the State Water Commission, with state-wide jurisdiction. Such a system has been found to work well in each of the several states where it is now in effect.

Section 37 of the present act provides that the commission shall have power to supervise the distribution of water, but fails to provide the necessary machinery for such supervision. An amendment has, therefore, been prepared to provide this machinery. This amendment, like the preceding one, is an adaptation of the laws of neighboring states where the laws have worked successfully and to the benefit both of the water users and the state.

## WATER APPROPRIATIONS DETRIMENTAL TO THE PUBLIC WELFARE.

The new water legislation in other western states specifically authorizes the official or board having jurisdiction over new appropriations to reject those which are deemed detrimental to the public welfare. To

avoid any questions as to the powers of the Water Commission in this regard, it is recommended that section 15 of the act be so amended as to definitely include such authority.

## FEES AND CHARGES.

Section 23 of the Water Commission Act provides that a certain fee shall be paid upon the filing of an application and that upon receiving a license and annually thereafter a licensee shall pay a certain charge for the use of water. It appears, however, that the latter charge is unfair and tends to retard the development of water projects for the reason that it penalizes new projects inasmuch as competing projects which acquired water rights under the old law need pay no such charges. The interests of the state would be better served by the development due to the greater use of water than by the collection of a comparatively small annual sum for the use of water. A fourth amendment is therefore recommended to abolish the annual charge for the use of water and to revise the schedule of filing fees on a lower and more satisfactory basis.

# WATER RIGHTS IN CALIFORNIA.

## In Which the Principal Matter Discussed Is That of Riparian Rights.

By A. E. CHANDLER, Member of California State Water Commission.

The latest statement of the California Supreme Court regarding the relative position of the doctrine of riparian rights and that of prior appropriation in this state is given in the following extract from *Duckworth* vs. *Watsonville Water & Light Company* (150 Pac. 58).

> "These decisions show that while an appropriation or diversion made upon lands of the United States gives the appropriator or diverter a right to the water as against the United States it does so solely because by the act of congress of July 26, 1866 (14 U. S. Stats. 253), the United States declared that such diversion, if recognized by local laws, should be effectual to confer upon the diverter the riparian rights in the stream pertaining to the land of the United States abutting thereon, that it gives no right as against other landowners, that this does not take place upon the theory that the water is held by the United States for public use, but because, as proprietor of the land, the United States, by that act, granted a part of its property in its land to such diverter. Also they show that the appropriator under the Code may obtain a similar right as against riparian rights of the state pertaining to any lands which the state may own along the course of stream; but that this right may be thus acquired, solely because the state in section 1410 of the Civil Code has so declared and that this declaration binds the state as to its proprietary lands, but does not affect lands of other persons or water rights pertaining to such other lands, and that, except its riparian rights pertaining to lands which it owns bordering upon non-navigable streams, the state has no right to the waters thereof and, consequently, can not dispose of any other rights."

The above statement leaves no doubt of the legal inferiority of the doctrine of prior appropriation in California. The economic superiority of the doctrine of appropriation, however, is now so generally recognized that it need not be argued here. To illustrate the unfitness of the riparian doctrine it is sufficient to but refer to the words of the Colorado Supreme Court in an early case (*Coffin* vs. *Left Hand Ditch Co.*, 6 Colo. 443):

> "Imperative necessity, unknown to the countries which gave it (the riparian doctrine) birth, compels the recognition of another doctrine in conflict therewith."

Similar language was indulged in by the supreme court of the other strictly arid states in abrogating the doctrine of riparian rights, and the states now standing with Colorado in the exclusive recognition

of the doctrine of prior appropriation are Arizona, Colorado, Idaho, Nevada, New Mexico, Utah and Wyoming.

That the doctrine of riparian rights is still upheld in the semihumid states of the west is due in a very large measure to the California case of *Lux* vs. *Haggin* (69 Cal. 255) decided by a divided court of four to three. The decision was written at too early a date for a majority of the court to appreciate the absolute necessity of the doctrine of prior appropriation, as is shown by the following quotation from the opinion:

> "It does not require a prophetic vision to anticipate that the adoption of the rule, so called, of 'appropriation' would result in a monopoly of all the waters of the state by comparatively few individuals."

In striking contrast to the above view is the present attitude of the California Supreme Court towards the doctrine of prior appropriation, as is shown by the following quotation from the recent case of *Hufford* vs. *Dye* (162 Cal. 147):

> "It is the well settled law of this state that one making an appropriation of the waters of a stream acquires no title to the waters but only a right to their beneficial use and only to the extent that they are employed for that purpose. His right is not measured by the extent of his appropriation, as stated in his notice or by his actual diversion from the stream, but by the extent to which he applies such waters for useful or beneficial purposes. Beyond that his appropriation or diversion of more than can be applied by him gives him no right to the excess, and this is subject to appropriation by any other person who may use it for similar beneficial purposes."

It must be emphasized at this point that the doctrine of riparian rights was abrogated *by the courts* in the strictly arid states, enumerated above, and not by legislative enactment or constitutional provision. This statement is subject to two qualifications, however. In Nebraska it has been held in the case of *Crawford* vs. *Hathaway* (67 Neb. 325) that the state irrigation act of 1889 abrogated the common law rule of riparian ownership and substituted that of prior appropriation, but that said legislation could not and did not have the effect of abolishing riparian rights which had already accrued, but only of preventing the acquisition of such rights in the future. The Supreme Court of Oregon in *Hough* vs. *Porter* (51 Ore. 318), in interpreting the desert land act of March 3, 1877, held that public lands entered after the date of said act were accepted with the implied understanding that (except as to water for domestic purposes) the first to appropriate and use the water for the purpose specified in the act should have the superior right thereto.

If the supreme courts of the other semihumid western states were to follow the Nebraska Supreme Court they would declare that no riparian

water right attached to any lands entered after the passage of the state act regulating the appropriation of water. The first California statute governing the appropriation of water was that of March 21, 1872, a section of which (section 1422 of the Civil Code) contained the following words: "The rights of riparian proprietors are not affected by the provisions of this title." This section was interpreted by the California Supreme Court in *Lux* vs. *Haggin,* wherein it was held:

> "Section 1422 of the Civil Code is protective, not only of riparian rights existing when the code was adopted, but also of the riparian rights of those who acquired a title to land from the state, after the adoption of the code and before an appropriation of water in accordance with the code provisions."

At the first legislative session (1887) after the decision of *Lux* vs. *Haggin,* section 1422 was repealed with the proviso, "that the repeal of this section shall not in any way interfere with any right already vested." This action opened the way for a very sound appeal to the California Supreme Court to follow the Nebraska Supreme Court, but, so far as I know, no very earnest effort has been made along this line.

As the Oregon Supreme Court in *Hough* vs. *Porter* dealt with a congressional statute, there is an opportunity for the supreme courts of those states still recognizing the riparian doctrine to follow the Oregon court and to hold that no public land entered since March 3, 1877, has a riparian water right. In *Still* vs. *Palouse Irrigation and Power Co.* (117 Pac. 466) the Supreme Court of Washington considered the rule laid down in *Hough* vs. *Porter* but refused to follow it, holding that "the act itself manifestly relates only to the reclamation of desert lands." The Supreme Court of the United States in *Boquillas Cattle Company* vs. *Curtis* (213 U. S. 339) had its attention called to *Hough* vs. *Porter,* but, as on other grounds it held that the riparian doctrine was not applicable in Arizona it simply stated,

> "The opinion that we have expressed makes it unnecessary to to decide whether land in the arid regions patented after the act of March 3, 1877 * * * are not accepted subject to the rule that priority of appropriation gives priority of right by virtue of that act construed with Rev. Stat. 2339. The Supreme Court of Oregon has rendered a decision to that effect on plausible grounds."

Passing to the lateral limits of riparian lands—that is, to the extent to which the riparian right reaches from the stream—no western supreme court has done more than the Supreme Court of California to restrict such limits. Owing to the Spanish grants in this state there have existed in a single ownership far larger tracts than is the condition in other states—that is, so far as the early history of the chain of title is concerned. With the single exception of an Oregon case the

courts have restricted the riparian lands to the drainage area. These limits have been further restricted by the California Supreme Court in *Bochmer* vs. *Big Rock Irr. Dist.* (117 Cal. 27) to the original tract granted by the government, through part of which the stream flows, and this area would ordinarily be but 160 acres in the case of homestead entries and 320 acres in the case of desert land entries. By the principle laid down in *Anaheim Union Water Co.* vs. *Fuller* (150 Cal. 331) the lateral limits have been still further restricted to the smallest tract at one time in a single ownership.

The Spanish grants now in a single ownership must eventually be subdivided and held in small tracts. There is no doubt that as between the subdivisions within the original grant the conveyances can be so drawn that the riparian right of the original grant may be prorated among the subdivisions. The California Supreme Court, however, has not yet decided whether such a subdivision not touching the stream possesses a riparian right as against water claimants outside of the original grant. Here lies the possibility of a still greater restriction of lateral limits.

Numbers of suggestions have been made regarding methods for limiting or abolishing the riparian right by legislation. The present California Water Commission Act provides, in section 11, that the non-application of water to beneficial purposes upon riparian lands for any continuous period of ten successive years shall be deemed to be conclusive presumption that the use of such water is not needed upon said lands. This provision flies in the face of the principle, so often reiterated, that the riparian right is not created by use and it does not cease with disuse. The California Supreme Court itself, however, by way of dictum only, has said:

> "It may well be that there is room for an even need for legislation which will require riparian proprietors to exercise their irrigation rights in the use of water within a limited period, or to be decreed to have waived these rights. Other similar legislation making for the general good will readily occur to one's mind. But it is not the province of this court to legislate, and it would be abhorrent to justice now to say to an upper riparian proprietor, who has rested in security upon the rights which this court has over and over again declared to be his, that he has lost those rights through no fault or failure of his own, but simply because he has not seen fit to use the waters upon his riparian land. We take it that the legislature itself would be slow so to decree without giving the riparian proprietor an opportunity to make a beneficial use of the waters. We are asked to do this without giving him such an opportunity. This would be equivalent to this court erecting a statute of limitations against an upper riparian proprietor and in the same breath decreeing that it had barred all his rights."
>
> (*Miller & Lux* vs. *Enterprise, etc.*, 47 Cal. Dec. 1, 7.)

It seems certain that legislation limiting the time within which action may be brought by a riparian owner against appropriators will be upheld as valid. The prescriptive period at present in California is five years. Attempts were made at the last session of the California Legislature to further limit this period but they were not successful.

The California Supreme Court has said again and again that the riparian owner may restrain a diversion by an appropriator without showing damage, upon the broad doctrine that the taking itself is an interference with his freehold which he is entitled to restrain lest it ripen into a prescriptive right. Attempts have been made in the California Legislature to so amend the Code of Civil Procedure that a clear showing may be made by the defendant, in such injunction cases, of the damage, if any, which the riparian owner will suffer on account of the proposed appropriation. As no one except the most unreasonable of riparian owners should object to such legislation, it undoubtedly will be adopted in the near future.

The early cases in California dealing with the occupancy of mineral lands and the use of water, in connection therewith, recognized the doctrine of prior appropriation exclusively, as the parties in such cases were strangers to the title—that is, they were but trespassers upon the public lands. As the early custom regarding mineral claims was to post a notice upon such claim the same practice became fixed in appropriating water, and such notices were recorded long before statutes providing therefor were enacted. The basic principles of the doctrine of prior appropriation were likewise established by the courts before there were any general statutes upon the subject. The California statute of 1872 (sections 1410–1422 of the Civil Code) was but declaratory of the principles established by the courts.

Statutes similar to the California statutes were adopted in practically every western state. The first state in any way to make an advance upon this legislation, so far as the initiation of appropriations is concerned was Wyoming, where, due to the able direction of Elwood Mead (now of the University of California), a very complete irrigation code was adopted in 1890. Statutes similar to the Wyoming statutes governing appropriations were adopted in Nebraska in 1895, in Utah and Idaho in 1903, in Nevada, North Dakota, Oklahoma and South Dakota in 1905, in New Mexico in 1907, in Oregon in 1909, in California for power purposes only in 1911, and finally in California for all purposes in 1913. The last California act, however, was withheld by referendum and became effective December 19, 1914.

Under the old California statutes no public offices had jurisdiction over appropriations. It was only necessary to post a notice, record it and to begin the work within a specified time and prosecute it with reasonable diligence to completion. It was this question of reasonable

diligence in regard to which new legislation was most needed. Under the new statutes, as first adopted in Wyoming, a central office, generally the State Engineer (in California, the State Water Commission), has jurisdiction over all new appropriations. When it is found that an application will not conflict with existing rights and will not prove detrimental to the public welfare, it is approved by the central office and, in the approval, a time is fixed within which construction must begin, within which construction must be completed, and within which the water must be applied to beneficial use. The appropriator, therefore, knows before spending a dollar in construction the exact time within which he must consummate the several steps incident to his work.

There is an impression, even among the supposedly well informed, that under the old statute all that one had to do to maintain the legality of an appropriation was to put a wheelbarrow and pick and shovel man upon the job and keep him there through the years. Such an idea has never been reflected in the decisions of any supreme court regarding the exercises of reasonable diligence in water appropriations. The newer statutes generally fix five years as the time within which the construction of even the very largest works must be completed, although in a number of states discretion is given to the central office to extend this time for reasons deemed by it sufficient.

Unfortunately for themselves, there are a number of individuals scattered throughout California and other western states, who through the intervening years, have been employing the pick and shovel men as above suggested. At the rate they are working, it would take several decades to complete the necessary construction. One of the leading cases dealing with reasonable diligence is *Ophir Mining Company* vs. *Carpenter* (4 Nev. 534), in which it is said, "diligence is defined to be the 'steady application to business of any kind, constant effort to accomplish any undertaking.' The law does not require any unusual or extraordinary efforts, but only that which is usual, ordinary and reasonable." An apt reflection upon many of our own instances of so-called reasonable diligence is contained in the following words of the court in the Ophir case: "Rose during this time may have dreamed of his canal completed, seen it with his mind's eye yielding him a great revenue; he may have indulged the hope of providential interposition in his favor; but this can not be called a diligent prosecution of his enterprise. Surely he could hardly have expected to complete it during his natural life by such efforts as were made through this period."

Under section 12 of the California Water Commission Act, one who has initiated his appropriation prior to the passage of the act may apply to the Water Commission to have the time fixed within which the water

appropriated must be applied to beneficial use. In acting upon all applications under this section, the California Water Commission will favorably consider only those appropriations where work has been carried on in a businesslike way, and will reject the application in those cases where only trail building or survey work has been carried on for a number of years.

The idea is also current that lack of means is an excuse for lack of reasonable diligence in the construction work. Long ago the California Supreme Court in *Mitchell* vs. *Canal Co.* (75 Cal. 464) disposed of this question in the following words:

> "The parties prosecuting the work must have the ability to complete the work in a reasonable time, and pecuniary inability to complete the work in a reasonable time can not be urged as an excuse for not prosecuting the work."

There is also a view extant in California, even among attorneys, that water can not be appropriated for diversion from one watershed into another. A description of the various irrigation systems of the state would contain great numbers of projects where the water has been so diverted. That such diversions are legal, so far as any appropriation may be deemed to be legal, is well illustrated by the following words from the opinion of the California Supreme Court in the *Miller-Lux* vs. *Fresno Flume Co.* (158 Cal. 626):

> "In *Miller* vs. *Bay Cities Water Co.*, 157 Cal. 256 (107 Pac. 115) the principle is clearly recognized and declared that an appropriator of water may divert for use to any point beyond the watershed any portion of the waters of the stream which serves no useful purpose either to the riparian owners, or in supplying the underground stratum, or such waters as are in excess the quantity necessary for such purposes."

The present California Water Commission Act contains a certain provision not found in the irrigation statutes of any other western state. It deals with the question of the capitalization of the water right. Until very recently a great number held that the water right in California and other states belonged to the landowner and not to the canal company. The Supreme Court of the United States, however, in *San Joaquin and Kings River Canal and Irrigation Company* vs. *Stanislaus County* (233 U. S. 454) has held to the contrary. Section 20 of the California Water Commission Act provides that the water right granted by the State Water Commission can never be capitalized for either rate fixing purposes or for purposes of sale to a political unit. As the best modern idea in granting franchises for any purpose is to fix them for an indeterminate period in such a way that they can not be capitalized, the other western states should follow the lead of California in this respect.

The new irrigation statutes, just like the original California statutes of 1872, so far as the fundamental principles of water law are concerned, are but declaratory of those laid down by the courts. Anyone of much experience in business matters well remembers the time when the typewriting machine was first introduced, when the stenographer was first employed, when the various bookkeeping and auditing systems, now considered so necessary in our business life, were first developed. The modern irrigation statutes simply introduce a system comparable to such innovations aiming for business efficiency. Instead of allowing an appropriator to go ahead blindly, as under the old statutes, and trust to luck that he would not be engaged in litigation over the exercise of reasonable diligence or on account of deficient water supply, his work so far as the time element is concerned is placed under the central office from start to finish, and, in cases where it is certain no unappropriated water remains, he is not allowed to proceed. The very best comment which can be made upon this new legislation is that, no matter how bitterly contested it may have been when first proposed, no serious attempt to abolish it has ever been made in those states in which it has been adopted.

This paper deals largely with riparian rights. The justification of such treatment is due to the fact that the riparian doctrine is legally the one great obstacle in the way of the best development of our water projects. The normal summer flow of practically all of our streams was long ago applied to beneficial use. To expand, storage reservoirs must be constructed, but in numerous cases the attitude of riparian owners makes such construction not feasible financially. As, except in the case of the few remaining Spanish grants, it is not practicable to construct projects for the irrigation of riparian lands exclusively, the riparian owner himself is injured by his fellow obstructionists.

The California Supreme Court in its treatment of the law of percolating waters has adopted a policy of true conservation. In *Burr* vs. *Maclay Rancho Co.* (154 Cal. 428) it said:

> "It is not the policy of the law to permit any of the available waters of the country to remain unused, or to allow one having the natural advantage of a situation which gives him a legal right to water to prevent another from using it, while he himself does not desire to do so. The established and settled law of riparian rights in running streams, which have become vested rights, may compel a different rule with regard to such waters in some instances, but these rules of law do not, of necessity, control rights in percolating waters."

To the man whose whole property and civic interest is in a riparian tract, the doctrine of riparian rights is necessarily an admirable one. To the riparian owner, who is using his water and is interested in other

land, to the irrigation districts, to the mutual and commercial irrigation companies, to the government projects, to the cities which are looking for a water supply, in short, to all who are part of the broader development, the doctrine of prior appropriation offers the way. It is, therefore, in the interest of all of these that we should try every way that other states have used and that we ourselves can suggest for casting off, as far as is lawful, the burden of riparian rights.

# THE WATER SUPPLY OF CALIFORNIA.

## Something of the Water Available for the Different Purposes.

In order to have a correct idea of the water supply of the state in relation to the demands which are now and will in the future be made upon it for agricultural, power, municipal, domestic and other uses, the size of the state, as well as the wide range and variation in its climatic and topographic conditions, should be kept in mind.

The great length of the state north and south, extending over ten degrees of latitude, from a humid area in the northwest corner to an arid area in the southeast, with the diversity of conditions from the coast to east caused by the two parallel mountain ranges traversing its length, creates a variety of conditions in the use and application of water which are unusual and complex. The scarcity of practical reservoir sites as well as the long growing season prevailing throughout adds to the duty required of the waters available for all uses when the development of the state requires that these waters shall be put to the greatest and most effective use. This realization on the part of the people of the state has caused it to assume a more complete supervision of the conservation, appropriation and use of its public waters.

### WATER AVAILABLE FOR IRRIGATION.

(From Bulletin No. 254, Irrigation Resources of California and Their Utilization.)

"The total area of irrigable agricultural land in the state of California found in the zones of irrigation water supplies, which includes all of the valley lands, the rolling plains of the Great Valley and the arable portions of the Sierra foothills up to about 3,000 feet elevation, and all of the plateaus and desert lands to which some irrigation water supplies are available, is approximately 22,000,000 acres, of which a little over 3,000,000 acres are irrigated and about 10,000,000 are estimated as the area to be ultimately irrigated. Of the total irrigable areas found, about 28.5 per cent are in northern California, 44 per cent in central California and 27.5 per cent in southern California. Of the total irrigated area, about 15 per cent is in northern California, 61 per cent in central California and 24 per cent in southern California. Of the areas it is estimated may ultimately be irrigated, about 35.5 per cent are in northern California, 44.5 per cent in central California and 20 per cent in southern California.

"The mean annual flow of the major surface streams of California, in round numbers, approaches 60,000,000 acre feet, or enough to cover all the irrigable land of the state to a depth of nearly three feet.

But this water does not all run where or when most needed for supplying the deficiencies in soil moisture in the cropped or cultivable fields, nor is the mean flow of streams the flow that measures possibilities of utilization except as storage is available to equalize all of the years, which is the case, so far as yet known, with a relatively few streams only. Therefore, the quantity of water available for irrigation is very much less than the total quantity carried in the streams. If an average of two acre feet per acre per year were eventually to be used on the entire area it is estimated may be ultimately irrigated, less than one-third of the mean annual flow for all the state would be required. But, as stated above, the distribution of this water is not equalized, as, for instance, in the Sacramento Valley all of the plains and adjacent arable Sierra foothills would receive two feet of water annually and there would still be left two-thirds of the mean outflow of the Sacramento River, as shown by records taken at Collinsville during a period of a few years. On the other hand, if the San Joaquin Valley and its plains and adjacent arable Sierra foothills should be likewise watered, it would require about a third more water than now enters the San Joaquin Valley in mean years. If all the irrigable lands listed for southern California were to be covered to a depth of only 1.5 feet, the full mean flow of all the streams of southern California would still lack 3,000,000 acre feet of being enough to irrigate the land. These figures do not make any allowance for seepage losses in transit."

## WATER AVAILABLE FOR POWER DEVELOPMENT.

Next to the state of Washington, California has the greatest potential hydroelectric resources of any state in the union. The three Pacific coast states, Washington, Oregon and California, have 42 per cent of all the available water power in the United States. In California the total amount of power used plus the capacity of plants now under construction is only about one-fifth of the state's minimum and one-tenth of its maximum water power resources. As electricity is fast becoming adapted to every use for which other fuel has been used in the past, it may be seen that the greater adaptability of this commodity to these uses will conserve our forests and natural oil for other uses and keep millions of dollars within the state which now goes to great foreign corporations for coal and also result in great saving to the people in final reduced costs for light, heat and power. When it is realized that all of the water in California not yet adapted to use comes directly under the authority of the State Water Commission, some idea of the importance of the commission's work may be seen. Mr. F. H. Fowler, district engineer of the United States Forest Service, has furnished

some figures which are interesting in relation to the water resources for power in California.

The most comprehensive estimate yet completed of the total theoretical horsepower available from the streams of the United States was made by the United States Geological Survey in 1908 and was later revised and corrected by Commissioner of Corporations in his report "Water Power Developed in the United States" in 1912. The computations were based on 90 per cent efficiency for the powerhouses, and the utilization of 90 per cent of the total fall available on stretches of the streams that were judged to be susceptible of power development.

According to estimate of the Survey, the streams in the United States with aid or storage will be able to produce at least 200,000,000 horsepower when they are completely developed. Without storage they will be capable of development to the amount of 53,905,000 horsepower on the basis of the maximum mean monthly flow available during the six lowest months of the year, and 27,943,000 horsepower on the maximum flow available during the two lowest weeks of the year.

No segregation of California's portion of total available horsepower with storage for the United States can be obtained, but the power available in California on the six months basis is 7,818,000 horsepower, and the power available on the basis of the lowest two weeks period is 3,424,000 horsepower. Corresponding figures for the three Pacific coast states—Washington, Oregon and California—are 23,078,000 and 11,504,000. The major portion of the power available in California is from streams in the Sacramento and San Joaquin river drainages, which find their outlet to the ocean through San Francisco Bay. The figures for these two drainages on the two above assumptions are 7,720,000 and 3,179,000 horsepower.

As of December 1, 1916, there are in operation on California hydroelectric transmission systems, the following hydroelectric plants:

| Drainage | Number of plants | Total installed capacity of machinery |
|---|---|---|
| Pacific coast drainage north of San Francisco Bay | 7 | 24,321 |
| Pacific coast drainage south of San Francisco Bay | 11 | 18,304 |
| Great Basin drainage from east slope of Sierra | 17 | 57,580 |
| Sacramento River drainage | 20 | 239,725 |
| San Joaquin River drainage | 20 | 261,936 |
| Totals | 75 | 601,866 |

The above figures include several small installations which, while actually located in Oregon or Nevada, are connected to transmission lines partly in California. In addition to the hydroelectric plants there is also an installed capacity of approximately 377,000 horsepower

in steam plants, operated as auxiliaries and reserves on the hydroelectric systems.

The comparison between the use of water and of steam for electric power is shown as follows:

The plants enumerated above produced, during the calendar year 1915—the latest for which figures are available—the following amounts of power:

| | | |
|---|---|---|
| Hydroelectric | 1,826,462,000 | kilowatt hours |
| Steam electric | 315,016,000 | kilowatt hours |
| Total steam and hydroelectric generated—all hydroelectric systems | 2,141,478,000 | kilowatt hours |

This is equivalent to a continuous output of 328,000 horsepower throughout the year, and as the mean output for the year is probably about .6 of the output at the moment of maximum demand, it is probable that the maximum demand, or peak (had all the companies been operating as a single system) would have been very close to 550,000 horsepower.

The most important plants now under construction are:

| | | |
|---|---|---|
| Pacific Gas and Electric Company— | | |
| Wise Plant | 16,750 | horsepower |
| Pacific Power Corporation— | | |
| Rush Creek Plant, Mono Lake Basin (second unit) | 6,700 | horsepower |
| California-Oregon Power Company— | | |
| Klamath River Plant | 67,000 | horsepower |
| Pacific Light and Power Corporation— | | |
| Additions to Big Creek Plants Nos. 1 and 2 | 70,000 | horsepower |
| Grand total | 160,000 | horsepower |

The most important proposed developments not yet actually under construction are those of

| | | |
|---|---|---|
| Great Western Power Company— | | |
| Feather River Developments | 400,000 | horsepower |
| Pacific Gas and Electric Company— | | |
| Bear River Developments (exclusive of part of Drum development already constructed, and Wise and Halsey Plants) | 100,000 | horsepower |
| Pacific Light and Power Corporation— | | |
| San Joaquin Developments (exclusive of present Big Creek Plant and additions thereto, under construction) | 98,000 | horsepower |
| Mt. Shasta Power Corporation— | | |
| Pit River Development | 160,000 | horsepower |
| Grand total proposed installed capacities of plants not yet under construction | 758,000 | horsepower |

While there is a wide margin between the total estimated potential powers, and the installed capacities of plants already constructed,

under construction, and proposed, the three latter classes will completely develop most of the sites that are highly attractive from a commercial standpoint.

## City of Los Angeles Power Development.

Prior to the organization of the present State Water Commission, the city of Los Angeles had made applications to the previous water commission as part of a plan for a municipal supply of water and power combined under public ownership by the city.

Under section 12 of the present act, Los Angeles applied to this commission to prescribe twelve years as the time within which the full amount of water appropriated should be applied to useful or beneficial purposes, to that extent bringing the project under the view of the present commission. The Los Angeles aqueduct, providing for a domestic water supply, has been virtually completed.

As stated by the Board of Public Service Commissioners of Los Angeles, the project is designed, first, to convey to the city a continuous flow of 400 second feet of water from the Owens River watershed, starting at a point north from the town of Independenec and about two hundred and fifty miles distant from Los Angeles; and, second, to provide for the generation of hydroelectric power from the fall of the water in the aqueduct at four different points and from the fall of the waters of certain natural streams in the Owens River and Mono Lake watersheds.

The power feature of the project, as proposed and planned, consists of four plants, located along the aqueduct, namely: the San Fernando plant, of 9,000 horsepower capacity, 25 miles from the city; the San Francisquito No. 2 plant, of 44,000 horsepower peak capacity, 40 miles from the city; the San Francisquito No. 1 plant, of 69,000 horsepower peak capacity, 47 miles from the city, and the Haiwee plant, of 6,000 horsepower capacity, 162 miles from the city. The first and last of these are constant flow plants, and the two in the San Francisquito Canyon are variable flow plants, with regulating reservoirs above No. 1 plant and below No. 2 plant, and with a waterway capacity between these reservoirs of 1,000 second feet, or two and one-half times the capacity of the aqueduct.

In addition to the above, the power system of this city embraces three plants on Cottonwood Creek, in Inyo County, totaling 10,000 horsepower, 185 miles from the city; one plant on Division Creek, of 800 horsepower capacity, 225 miles from the city; three plants on Big Pine Creek, totaling 12,000 horsepower maximum, or about 8,000 horsepower of reliable power throughout the year, 240 miles from the city; three plants along the Owens River gorge, below the city's

Long Valley reservoir site, 265 miles from the city, totaling 42,500 horsepower, with the natural flow of the river equated, and additional power, amounting to about 37,500 horsepower, to be developed at the three plants along the Owens River gorge, by the diversion of water from the Mono Lake watershed, and at plants on Rush and Levining creeks. All plant capacities are given as at the plant switchboard.

The power system includes, in addition to the reservoirs already referred to, the Haiwee reservoir, situated just above the Haiwee plant, and which has been completed, and has a capacity sufficient to supply the full flow of the aqueduct for three months; a reservoir in Long Valley, in which may be stored something like one year's supply, and storage reservoirs on all of the creeks mentioned, except Division Creek.

The plan of the transmission system embraces four three-phase circuits, two on each of two steel tower lines, and the complete power system, as outlined, would deliver, at the city, 200,000 horsepower, peak capacity, of reliable hydroelectric power, at a total cost approximating $22,000,000, including the full cost of the proposed diversion from the Mono Lake watershed.

The city has expended approximately $24,500,000 on the construction of the aqueduct system and $3,500,000 on surveys and preliminary engineering work in connection with the complete power system, and on works for the development of 37,500 horsepower in San Francisquito Canyon and the transmission of the same to the city. The city has also authorized $6,500,000 of additional bonds for the purpose of completing the generating works under construction and providing a system for the distribution of the power within the city.

The portion of the system now being constructed conforms to the plan of the complete system, as above outlined, and its actual cost, to date, has been $120,000 more than it would have been had the city contemplated only the use of the power opportunities along the aqueduct itself.

As a further development of its proposed power system, the city of Los Angeles filed with this commission on October 23, 1916, an application for permission to appropriate 200 cubic feet per second of the waters of the south fork of the Kern River in Tulare County. It is proposed to develop 18,000 theoretical horsepower at an estimated cost of $1,500,000.

## WATER FOR MINING IN CALIFORNIA.

California, one of the foremost states in the Union in the variety and production of minerals and mineral substances, yields commercially a greater number and variety of mineral products than any other state.

There were forty-nine different mineral substances reported during 1915, and of fifty-eight counties in the state all but two contributed some mineral product. These products, rated in the order of their value, consisted in part of petroleum, gold, copper, cement, quicksilver, tungsten concentrates, magnesite, manganese and chromite. All of these, with the exception of petroleum, indicated a marked increase in volume and value as compared with 1914, due in a measure to the European war, which has created a demand for a larger output at better prices. As an index to California's importance as a producer of mineral products the total value of her output ($93,663,369 for 1915) is surpassed by but four states, they being the great coal and iron producers east of the Mississippi River. In the production, reduction, recovery and manufacture of these mineral substances water, and in some instances, large volumes of it, is required.

With the discovery of gold at Coloma, the miners learned that water was absolutely essential for mining of the auriferous gravels, and in the reduction of gold-bearing ores, as well as for the concentration of their precious content, so rules and regulations for the right of the use of water was coincident with the discovery of gold. The rules of common law relative to the rights to water and use of water were unsuited to the wants of California, so primarily the miners were governed solely by the local laws, customs and rules of miners adopted in the various camps or diggings.

As indicated elsewhere in this report applications for the use of water for mining, and the generation of power for mining purposes, is comparatively a small percentage of the applications filed with the commission. This is due to two causes: first, that the mines and mining companies have been operating for many years and have acquired title under the law of appropriation; second, for the generation of power many operators have installed or substituted electricity for water or steam, purchasing same from the power companies.

The value of the mineral output of this state for the year 1916 will exceed that of 1915—the only decrease being in that of gold, due to the strike of miners in Amador County, the increased cost of labor and supplies, and consequently decreased purchasing power. It would be folly to attempt to set a limit of maximum mineral production for California, because the mineral resources are so extensive and have been so slightly developed along many lines.

It is not probable that water will be used to as large a degree according to the scope of operation or in as large a volume in the mining industry in the future as in the past, except in the generation of power.

## NEW USES FOR ELECTRIC ENERGY.

New phases of the use of electric energy will enable the state to add ultimate wealth in property and prosperity. Just a few of them may be mentioned. The world's supply of nitrate comes from Chili, and it is predicted that this supply will soon be exhausted. The countries of Europe are rapidly establishing nitrate fixation plants whereby nitrogen is extracted from the air by means of electricity. Chilean nitrate is only 12 per cent efficient, while the nitrogen extracted from the air is 60 per cent active. The United States imports 625,000 tons of nitrate annually at a cost of $21,000,000, of which $8,000,000 is export duty paid to Chili. It has been calculated that the whole amount necessary for the United States could be manufactured in California by the use of 1,000,000 electrical horsepower. This state alone uses $2,250,000 worth of Chilean nitrate annually. This product is used both for the manufacturing of explosives and for fertilizer. Statistics are given to show that in Germany by the use of 2,000,000 tons of nitrate 63,000,000 additional tons increase in crops was secured.

The manufacturing of electrochemicals and the ultimate use of the electric furnace in the manufacture of iron and steel instead of with coke and coal give an indication of the possibilities that lie in the water power resources of the state and the subsequent importance of the duties of this commission in regard to the appropriation and administration of water affairs in this connection.

# THE DUTY OF WATER

## Knowledge of the Proper Use of Water Has Become an Extremely Important Matter.

The Water Commission considers the duty of water of utmost importance, especially in the future conditions of water use in the state. In the earlier history of water diversions there was plenty for all users, but conditions have changed until now the practice of conservation has become absolutely necessary, and the excessive use of water by some persons results in a scarcity for others. In addition to this, land on which water is used excessively is not only injured, but adjoining lands may suffer.

The Water Commission has attempted to set a standard for the duty of water as it applies to ordinary culture. This does not refer to unusual crops such as rice, which requires a greater amount, nor to certain characters of soil which may necessitate a larger application for irrigation purposes. For ordinary uses the commission has fixed upon a maximum allowance of one second foot for 80 acres of land.

In a paper on the "Duty of Water," prepared for the Water Problems Conference, Mr. A. Griffin, engineer of the South San Joaquin Irrigation District, where the soil is mostly of an open nature, says in part:

"The expression 'duty of water' is somewhat loosely used and has reference to the water applied to crops by irrigation to promote growth. As ordinarily used it is variously expressed by a ratio, showing the amount of water per acre, or the number of acres per cubic foot per second, or the depth over the land. The word 'duty' expresses an obligation and in my judgment the expression 'duty of water' should be used to express the most efficient use of water and the expression 'use of water' to express the actual use.

"Fundamentally, the water requirement of a crop is equal to the amount transpired by the plant plus the amount retained by the plant and both these factors may vary for different crops or for the same crop grown under different conditions. The water required is supplied by rainfall, by water percolating in the soil or moving in the soil under the influence of capillarity from underground sources, by the moisture in the air and by irrigation or artificial application of water.

"In practice water is applied to crops by practical methods and at practical intervals, both adapted as far as can be, or so far as is necessary to the conditions of soil, climate, water-supply, kind of crop, etc., to supply that part of the water requirement not supplied by natural

means. The most efficient use of water under such conditions might properly be termed the duty of water, the efficiency to be measured by the dollar standard.

"Under irrigated conditions the water requirement of the crop is ordinarily supplied mainly by irrigation and rainfall, which is each in itself a variable quantity. but when the position of the ground water is favorable the amount of water supplied by percolation or capillarity may become of preponderating importance. The use of the term 'duty of water' is sometimes further confused by considering it as covering the rainfall or other sources of water as well as irrigation, but I shall confine the meaning of either 'duty' or 'use' of water to the water artificially applied.

"Both the duty and use of water are very variable, varying with the kind of crop, its conditions, the rainfall, humidity, sunshine, temperature, soil, ground water, evaporation, quantity available, cost of water, manner of paying for water, crop yields, prices, etc. The most efficient use of water when water is plentiful and land is scarce is not the most efficient use if water is scarce, relatively, to the land tributary to it. Both the duty and the use of water are then changing constantly as the factors mentioned above change. It is therefore impossible to determine either the duty or use of water except possibly for a certain date or a limited period. This situation is fundamental and no amount of study or investigation can overcome it, although study and investigation have been very useful and continued work is desirable to increase our knowledge and comprehension of the subject of the use of water.

"As the subject of the use of water becomes better and more generally understood and with the increasing economic pressure there is a growing tendency to use water more economically and efficiently. Contrary to general opinion, a more efficient use of water will frequently mean a more liberal use of water, while in other cases it will mean a more sparing use. While the duty of water is necessarily variable and it will never be possible to fix the duty, either for a crop or a locality, it is frequently possible by observation of the soil and the crop and by moisture measurements to determine that too much or too little water is being used in any particular case. Measurements of the amount of water used in any locality and investigations of the water requirements of crops and the unavoidable inefficiencies in supplying them by irrigation will permit the duty of water to be bounded by certain outside limits and a more general dissemination of knowledge obtained and the principles established will become an educational factor of great importance in the approaching of the duty of water and the work done along these lines to date has already been of very great educational importance.

"The most efficient use of water consists of so using the water avail

able as to produce the greatest net returns to the individual or to the community or to the state, and it is well to recognize here that the interests of the two do not always coincide. The best method to secure an efficient use of water is through continued educational work of a practical nature carried on among the people who use water, by themselves and by investigators who approach the subject with a clear knowledge of just what constitutes an efficient use of water. I believe that considerable work of this nature has failed in producing good results because the men back of it had a preconceived idea that water was always used in too much quantity and started in to inveigh against this excessive use. The efforts of such men are worse than useless if they are directed against a farmer who is facing a difficult financial problem and who, while he may be sadly in need of information and advice, listens impatiently, if at all, to a man who tells him that he is using too much water, when he knows that his crop is burning for lack of water. There is, of course, a natural tendency to use too much water when it is available and this should be combatted by intelligent educational methods.

"The most efficient use of water today, and it will probably always be, is by practical, intelligent men, amply supplied with capital and skilled in the preparation of the land, the use of water and the growing and marketing of crops, and such men are the best judges we have of the uses of water and its duty. It would seem to me that any legislation defining or governing the duty or use of water, if any legislation be desirable, would have to be very broad, merely, as indicated above, fixing outside limits by statute, limiting the use of water broadly to a reasonably efficient use and providing for the administration of the law by practical, broad-minded men of the type described above. As time goes on, as conditions become more nearly fixed, as education and information spread, and as economic pressure forces economy, the stringency of the statutes may be increased to bring up the laggards in the efficiency of water."

# GROUND WATER.

## A Subject of Profound Interest and One Demanding Increasing Attention.

As the scarcity becomes more apparent, the connection between surface waters and the waters under the ground becomes more important and in need of closer attention. Such a subject has been presented to the commission just recently in the case of the Spring Valley Water Company of San Francisco and the Alameda County Water District of Alameda County, where the commission has been asked by both sides to a controversy involving subterranean waters in the Niles Cone to act as referee for the arbitration of the matter. This promises to become a famous case, in view of the comparatively meager amount of detailed investigations, so far, along these lines. Mr. Chas. H. Lee, hydraulic engineer, in a paper prepared for the Water Problems Conference, goes into the matter of ground water in an interesting and instructive manner, excerpts from which follow:

"The use of ground water sources for irrigation and domestic water supply is rapidly becoming an important element in the life and industry of California. Statistics presented in the United States irrigation census of 1910 show that the area irrigated by pumping from wells in 1909 was 277,000 acres, and the number of pumped wells was 9,297, with a combined capacity of nearly 1,000 cubic feet per second. Since 1910 there has been a very rapid increase in irrigation pumping. From data published by the Irrigation Investigations Office of Experiment Stations, United States Department of Agriculture (Bulletin 1, Progress Report of Cooperative Irrigation Investigations in California, 1912–1914, State of California Department of Engineering), the number of pumping plants in 1914 was 24,589, or more than two and one-half times the number in 1909. Assuming that the area under irrigation from pumping plants has increased in the same proportion, the acreage in 1914 would be approximately 700,000, and increasingly more since then. Most of the supply for this area has been developed since 1900. The area irrigated from ground water sources has increased from a small percentage of the total irrigated in 1900 to approximately 22 per cent in 1914. Although accurate data is not at hand, it is yet undoubtedly true that a far greater percentage of ground water is used for domestic, manufacturing and general municipal purposes than for irrigation.

"This extensive development of a natural resource of which little was previously known has brought new problems before the people of the

state which touch the very life of many communities. These problems are being met with, in one phase or another, wherever the development of ground water is being undertaken, and involve not only the interests of the southern part of the state, but also of central and northern California. Fortunately the California courts have established principles regarding the percolating of underground waters which, when applied, will conserve such waters and allow their widest possible use. There is, as yet, however, no administrative body with authority to apply these rules wherever occasion demands, and the only present means by which they can be put into effect is through expensive litigation between the parties themselves. * * * ''

## UNDERGROUND RESERVOIRS.

''The important ground water supplies of California are derived from porous and usually unconsolidated accumulations of gravel, sand and clay. These deposits overlie the impervious rock formation of the earth's crust and are found in most of our valleys and canyon bottoms, and along the shores of bays and the Pacific Ocean, where they form the coastal plains. The material composing these deposits had its origin in the adjacent hills and mountains, where the process of weathering breaks up the solid rock formations. The streams, flowing out on to the lowlands, transport this rock debris and deposit it in the depressions or basins of the earth's surface. In this manner the valleys have been filled and the coastal plains built up. This work has been going on for centuries and under favorable conditions immense quantities of material have accumulated.

''The extent and depth of these deposits vary, depending on the area and depth of the depression or basin which they occupy, the amount of available material, and the activity of the streams which are engaged in the work of transportation. In the case of the Sacramento and San Joaquin valleys, the area of transported material covers several thousand square miles. The important coast and southern California valleys are much smaller, few of them exceeding 100 square miles, and this is also true of the coastal plain areas. The less important valleys and canyon bottoms have a still smaller area, the latter often covering but a few acres.

''In many of the underground reservoirs of southern California more than 75 per cent of the unused supply is lost by evaporation from soil and plant surfaces; and even in central California the loss is seldom less than 50 per cent.

''For any reservoir, whether surface or subterranean, the relation of inflow to outflow is registered by the vertical movement of the water surface. Rising water-level indicates an excess in rate of supply and falling level a rate of outflow greater than inflow. Under natural

conditions, the adjustment of outflow to inflow for ground reservoirs is accomplished by the increase or shrinkage of the evaporating area and overflow into natural channels. Thus in the San Bernardino Valley, following a series of wet winters, there is always observed an expansion of the artesian area with its accompanying swampy condition and increased flow in Warm Creek and Santa Ana River, while the reverse is true after dry winters. Considering averages, however, inflow must equal outflow or there will be a persistent lowering of the ground water levels, shrinkage of evaporating area, reduction of artesian pressure and the drying up of springs and cienagas. Such a condition existed in southern California during the ten years dry period ending in 1904; and such a condition still continues in certain southern California basins where the combined natural and artificial outflow exceeds the rate of inflow.

"It is thus seen that the problem of determining the limit of the ground water supply is not one alone of observing fluctuating ground water levels, but must also be considered from the broader aspect of the relation of supply to demand. Recent progress in ground water investigations has shown that it is possible to determine with a certain degree of accuracy the actual quantity of inflow and outflow from underground reservoirs. The Los Angeles aqueduct has recently completed a series of measurements covering a period of three years during which the inflow and outflow were measured, the two quantities agreeing to within 10 per cent. Although conditions are not always as ideal as in the Owens Valley, yet results can be obtained in most cases which would make intelligent regulation of ground water reservoirs as possible and practical as for surface reservoirs.

"In conclusion: There are two important features of ground water supplies which should be kept in mind. First, that the ground water supply is the common source from which all users of water within a definite area are drawing, and that the effect of withdrawal from each well or group of wells is felt to a greater or less degree in every other well within the area. Second, that the ground water supply is composed of an underground reservoir of definite extent, fed by percolation from definite bodies of surface water and finding its outlet by percolation or spring flow into surface stream channels, by evaporation from moist soil and vegetation near the ground water outlet, and to a very limited extent by underflow. Thus every user of subterranean water is vitally interested in all other developments of ground water and also in the run-off from local rainfall, stream flow and the use of water for irrigation within an area covered by or tributary to the underground reservoir from which he draws."

## CALIFORNIA COURT DECISIONS RELATIVE TO GROUND WATER.

"The broad physical features of ground water supplies as they have thus been outlined have been, to a large extent, recognized by the California courts in a series of well-known cases, commencing with *Katz* vs. *Walkinshaw,* decided in the year 1903. Prior to this case the courts had generally accepted the common law rule of diffused percolating waters in dealing with ground water questions, unless it could be proven conclusively that there was a movement in a well-defined subterranean channel. Under the common law or English rule ground water is recognized as a part of the soil just as the minerals or rock found there. The exception included definitely known underground streams, the subflow of surface streams, percolations tributary to surface streams and subterranean lakes or artesian basins. The scientific study of ground water data, largely made possible by the extensive development of and use of ground water in southern California, has been brought to the attention of the courts in *Katz* vs. *Walkinshaw* and succeeding cases. The trend and import of these decisions has been to broaden the exceptions of the common law to percolating waters and for all practical purposes, to do away with the previous legal classifications of ground waters, namely, percolating waters and those that flow in a defined subterranean channel.

"Mr. Samuel C. Wiel (California Law Review, November, 1913, page 26) in a suggested codification of the decisions on this subject, has recently termed an underground reservoir with its source of supply and outlets 'consolidated underground and surface water supply.' He defines it as a 'definite body of water upon the surface, and the underground water proximately connected with same in natural occurrence.' He then lists the following instances of consolidated underground and surface water supplies: First, a surface watercourse with the underground water tributary thereto; second, a surface watercourse with the subflow of underground water immediately surrounding and beneath it and moving with it in the space reasonably well defined; third, a definite basin of underground water in a stream entering and depositing water into the basin by seepage from the stream, or with the stream leaving the basin and receiving water from seepage from the basin. The first and second cases are special instances of the third, except where the surface watercourse is in a canyon bottom or other restricted body of porous material. Such a body of material with its advancing ground water is obviously an 'underground stream' instead of an underground reservoir. A consideration of sources of ground water supply in practical use in this state, however, shows the so-called 'underground streams' to be of minor importance and in many instances to be underground reservoirs on a very small scale. Hence,

for all practical purposes, Mr. Wiel's 'consolidated underground and surface water supply' is the 'underground reservoir.' "

"The new rule governing the use of percolating waters occurring in underground reservoirs is now established firmly in California. This rule affirms that a natural ground water supply is a common benefit for the use of all lands having access to it and that each landowner is entitled to a reasonable use from the common supply upon his own land in conjunction with similar equal use by all other landowners. It furthermore allows use of the ground water supply on distant lands, in cases where there is a surplus over and above the present reasonable use by the overlying landowners. Thus, the new rule of percolating waters allows the widest possible use of the ground water supplies and has set a precedent which it is hoped will soon be universally applied to surface waters."

## THE NEED OF GROUND WATER LEGISLATION.

"Generally speaking, the need of legislation relative to ground water sources is to provide administrative machinery to put into practical effect the rules already laid down by the courts. This and other reasons will be stated and discussed in detail as follows:

"First. The surface and ground water supplies are so intimately related physically that one can not be completely regulated and administered without similar control of the other. The physical situation has been set forth in detail in this paper, and no further comment is here necessary. It is evident that the diversion of surface water from one district to another by the storage of flood waters may under certain conditions seriously affect the ground water supply in the district. Similarly, the extensive development of the ground water supply may, and often does, materially decrease the flow in streams depending upon percolating waters. The extension or shrinkage of irrigated areas or change in the use of surface water in irrigation may also materially affect the ground water supply and indirectly the stream flow. It is the water that is being dealt with, not the surface channel, and the fact that the water passes beneath the surface and is for a time hidden from view to again reappear farther down the stream, does not offer a logical reason for its exemption from control and regulation.

"Second. The use of ground water sources is in the development stage and rapidly increasing. In many districts the subterranean supplies are the only remaining supplies or sources of undeveloped water. Hence, if regulation of ground water sources is to be undertaken at all, the logical time to do so is *now,* while the situation is in a formative period. With the growth of communities, and the increased demand for ground water, the problems of just distribution of supply will multiply rapidly. If the users of water are already accustomed to state

control, the difficulties of solving these problems will be greatly simplified. Without state control, endless litigation would result with its enormous expense and accompaniment of hatred and suspicion often embracing whole communities. The only possible result of such a condition is insecurity for investment and retarded growth of whole districts.

"Third. There are a number of important ground reservoirs in the state where the development of ground water has reached and exceeded the safe yield. Water levels are persistently falling from year to year, regardless of climatic conditions, and the water extracted from them is at the expense of the storage reservoir which should be maintained for the inevitable series of dry years. There is no method or local means to oppose such an overdraft except by appeal to the courts. In many instances this is beyond the means of individual landowners and cooperative action is hard to obtain. The interests affected are thus without practical means of meeting the situation. In other instances extensive lawsuits have engendered hard feeling and suspicion and at best solving the matter only as between the litigants involved.

"Fourth. In other ground water reservoirs there is a surplus supply which in many instances is being dissipated by evaporation and is a dead loss to the community. The development of such water for beneficial use would not only eliminate the economic waste, but would in some instances, also drain and make fit for cultivation areas of land which are at present water-logged or so heavily charged with alkali that productive crops will not grow. Contemplated development of such water is often opposed by existing interests and there is no financially practical way by which protection can be obtained against litigation. In some cases local interests would not suffer injury at all. In other cases there might result a minor lowering of the water in wells which, if not offset by benefits resulting from land drainage, could easily be compensated by payment of reasonable damages by the new interests.

"Fifth. In many of the desert valleys of southeastern California, settlers, in entire ignorance of the physical situation, are investing money in wells and otherwise preparing to develop ground water supplies far in excess of the available yield. This development means economic loss to the individual and the state. In one instance with which the writer is familiar, out of 90,000 acres of agricultural land filed on in good faith under the provisions of the Desert Land and Homestead acts, it can be said with reasonable certainty that not more than 2 per cent can ever be put under cultivation. In this valley there has been spent possibly $300,000 in drilling wells, clearing land and fencing which will largely be a dead loss.

"Sixth. Water levels are being drawn down and water unnecessarily wasted from many underground reservoirs in which artesian water exists. The effect of this is similar to having the outlet of the reservoir

open the year round, whether the water is being used or not. The keeping of artesian wells capped when the water is not in use, is simply and inexpensively accomplished and will result not only in the eliminating of waste of a valuable resource, but also in decreased expense for pumping. A law was passed by the California state legislature in 1907 and amended in 1909 declaring artesian wells a public nuisance when not equipped with proper mechanical devices with which to arrest their flow, and the waste of artesian water was declared a misdemeanor. The responsibility for enforcing this law lies with the county officers, who are influenced more or less by local public opinion and strong private interests. As a result, the law has not been generally enforced. Impartial state legislation such as that carried out by the State Railroad Commission would undoubtedly prove more efficient.

"Seventh. There is a great need for a systematic collection of and scientific study of data relative to ground water resources, both for the purpose of obtaining information of local conditions and for the ascertainment of broad principles. Such information and study are needed even to a greater extent than in the case of surface water supply, for the reason that the ground waters are hidden from view and not to such a great extent a matter of common observation and knowledge. The gathering of such information requires knowledge of conditions over large areas and over extended periods of time, and it furthermore requires cooperation on the part of the local people, such as drillers of wells, water companies, etc. Such conditions can only be secured through a technical organization maintained by a disinterested party such as a state or federal government. The United States Geological Survey has done much toward establishing the general principles relating to origin and movement of ground water and is beginning to develop the possibilities of quantitative study. The funds available for such work, however, are pitifully small, and the investigations are scattered through a number of states so that work in California is more or less intermittent and confined to small areas. There is, therefore, much work to be done by the state along this line."

## SUGGESTED LEGISLATION.

"The legislation which the writer believes will meet the needs outlined above and best fit into the legislation already accomplished is as follows:

"Revise and remodel the present law creating the State Water Commission so as to remedy the evident defects and omissions, thus giving the officers of the Water Commission full opportunity to demonstrate the efficiency of such a body in dealing with surface water rights.

"Second. When this has been accomplished and the commission has proven its worth to the people of the state, extend the provisions of

the law so as to include the ground waters, following the rules so clearly defined by the courts already, but corroborating them as far as possible with the administrative principles already established for surface waters.

"Third. In addition to its duties as an administrative body, the commission should be also authorized and provided with funds to maintain a permanent technical organization in charge of a competent hydraulic engineer whose duties should include that of carrying on scientific investigations and studies of ground water supplies and their relations to surface waters, either independently or in cooperation with the United States Geological Survey. The commission would thus have at its command the machinery necessary for investigation of the difficult, scientific and technical questions which arise in the determination of the source and amount of percolating ground waters. A further field for usefulness for such an engineering corps would be the issuing of public reports for the information of the people interested in the development of ground water resources.

"The writer has merely attempted to present in a preliminary manner his general ideas on the subject of ground water. He earnestly hopes that the needed improvements in the present Water Commission law can be accomplished at an early date, thus paving the way for the needed ground water legislation."

# "SPREADING" OF WATERS.

## A Comparatively New Method of Saving Waters That Would Otherwise Run to the Sea.

The "spreading" of waters from streams during their flood stages over tributary areas of land for the purpose of storing those waters in the soil is a conservation idea comparatively in its infancy but which is being worked out by the Water Conservation Association in southern California.

Mr. Francis Cuttle, president of the association, has furnished a brief article on the subject. In a letter accompanying the article Mr. Cuttle says:

"The only suggestion I have is that the law should be amended so as to give the State Water Commission jurisdiction over underground waters. I have in mind the tremendous expense and long drawn out litigation that has been gone through between the city of San Bernardino, the city of Riverside and the Riverside Water Company, covering nearly a year of actual trial at court, involving the expenditure of over $100,000 to the parties to this litigation, and it is not likely that much will be accomplished when all of this expense and trouble has been incurred."

### Conservation of Storm Water by Spreading on Debris Cone.

(By Francis Cuttle.)

This article refers particularly to the work being done by the Water Conservation Association, a corporation incorporated in the year 1907, its purpose being "To conserve the surface and subsurface waters of the Santa Ana River and its tributaries situated in the counties of San Bernardino, Riverside and Orange, in the state of California, by spreading the winter flood water of said river and its tributaries in the San Bernardino Basin and elsewhere over such lands adjacent to the channel thereof as may be available for that purpose; by securing control of such lands as may be necessary or desirable for such spreading; by purchase, lease, gift, donation, license or other methods as may be found most desirable; by the construction, maintenance and operation thereon of such works as may be found most advantageous and desirable for the purpose."

After the organization of this association it secured by purchase and lease about 1,100 acres of land. The association also secured an act of congress setting aside certain other lands to be used solely for the

purpose of spreading and conserving storm water. These lands were valueless for any other purpose, but very valuable for the conservation of storm water. In all the association controls at this time about 2,800 acres of land.

It has built diverting works consisting of three intakes from the Santa Ana River and from these intakes has built contour ditches across the debris cone and from these ditches are many outlets from which the water is turned onto the sand and gravel, where it sinks to come out at lower levels and thereby replenish the artesian wells, streams and springs during the long dry summers which are characteristic of the climate of southern California, and during which water is so valuable and necessary for domestic and irrigation purposes.

The method of diversion from the river is a simple one, loose boulder dams being constructed to divert the water from the river through the headgates and into the contour ditches. In one instance a type of dam known as the Pedley dam (a patented design) was constructed. This dam consisted of a wire bag or net into which boulders were laid, the bag then being brought up on both sides of the dam of boulders and fastened securely. The first one of these dams washed away. A more substantial one was built with heavier wire and below it was built an apron of boulders fastened together by drilling into the boulders and then inserting galvanized wire cable into these holes and then pouring hot lead into the holes, so that the whole apron below the dam was tied together securely by these wire cables. During the heavy floods of 1916 this dam stood, but the river washed around the ends of it and cut away the loose boulders and gravel to such an extent as to make it necessary to rebuild again after the storm water had subsided.

An accurate record has been kept of the amount of water spread only since 1912. It is as follows:

| | | | | | |
|---|---|---|---|---|---|
| 1912 | 293,238.77 | day | miner's inches | or | 11,729.55 acre feet |
| 1913 | 82,971.30 | day | miner's inches | or | 3,318.85 acre feet |
| 1914 | 891,893.32 | day | miner's inches | or | 35,675.73 acre feet |
| 1915 | 717,634.49 | day | miner's inches | or | 28,705.38 acre feet |
| 1916 | 274,555.93 | day | miner's inches | or | 10,982.23 acre feet |

The question of whether or not the spreading of storm water on this debris cone has replenished the artesian supply of the San Bernardino artesian basin, about five miles distant and approximately 500 feet lower in elevation, has been a question bitterly disputed in the litigation which has recently taken place between the city of San Bernardino, city of Riverside and Riverside Water Company, and without going into the merits of this case it may be sufficient to say that the judge in an oral decision on the facts in the case said:

> "I do not believe that we can account for the great volume of water in that region of the artesian basin save upon the hypothesis

that it came down the Santa Ana River, flowed and flowed for a long time in a channel which penetrated the Antil region (the most prolific part of the San Bernardino artesian basin), thus creating away down deep under the ground an ancient river channel through which waters from the head of the cone of the Santa Ana River may percolate downward into the Antil region. I don't believe we can account for the vast amount of water found in the Antil region save upon some such hypothesis as that. * * * I think, therefore, the Meacham well shows that there is not enough water coming down from the northern cone to account for the vast productivity of the Antil wells, and that that productivity can only be accounted for by assuming that the Santa Ana River at one time formed a channel which is now many, many, perhaps hundreds of feet under the surface of the ground, and I shall so find."

While there is a difference of opinion between the experts employed in this notable case, as to whether or not the spreading of this storm water really would replenish artesian wells five miles distant, the court being the umpire and having the last word, has stated that in his opinion the spreading of such storm water did replenish these wells.

The cost of the spreading of this storm water has been ascertained to be about 15 cents per acre-foot. Of course, not all of the water sunk on the debris cone is again available for beneficial purposes, but the best engineering advice on the subject claims that about 25 per cent of the water sunk is again available for beneficial purposes. That being the case, the cost of water available for beneficial purposes would be about 60 cents per acre-foot, which of course would be a very low cost for a water supply in most regions in California.

A practical test was made of the spreading of this storm water to ascertain the amount of water absorbed by spreading on the surface. As nearly as it can be estimated, about 160 inches of water was sunk continuously to the acre. Nine reservoirs, having an average depth of not over three feet and an average area of about two acres, absorbed continuously about 1,000 inches of water.

## ARTICLES OF INCORPORATION.

The Water Conservation Association is an incorporated body and the purposes for which it is formed are set forth in the articles of incorporation as follows:

"To conserve the surface and subsurface waters of the Santa Ana River and its tributaries situated in the counties of San Bernardino, Riverside and Orange, in the state of California:

"(*a*) By spreading the winter flood waters of said river and its tributaries, in the San Bernardino basin and elsewhere, over such lands adjacent to the channel thereof as may be available for that purpose;

"(*b*) By securing control of such lands as may be necessary or

desirable for such spreading, by purchase, lease, gift, donation, license or other methods as may be found most desirable;

"(*c*) By the construction, maintenance and operation thereon of such works as may be found most advantageous and desirable for the purpose;

"(*d*) By prevention of waste of artesian and subsurface waters of said stream and the tributaries and sources of supply thereof, by the enforcement of the law of this state prohibiting waste of such water, and by securing evidence of such violation, and by the prosecution of the violators of said law;

"(*e*) By such other methods of conserving the waters of said stream and its tributaries as the board of directors of the association shall determine."

Each member pays a membership fee of $5.00 and the interest and right of each member is equal.

# CHECK DAMS

**A European Method Which Is Being Used to Conserve Flood Waters.**

Due to the necessity of flood control and of more water for irrigation, southern California is developing a comparatively new method of conserving waters in this country, although Switzerland and Austria and Japan, notably, have successfully demonstrated its efficiency. The use of retarding or check dams is the method referred to. The check dam, like the spreading of water, is only one phase of the work in the south, and both are spoken of herein on account of being comparatively later developments in the field of water problems and likewise conservation measures. The spreading of flood flows on the gravel cones below the mouths of canyons does not promise enough relief in itself from maximum flood flows on account of the limits of application. The check dam theory is to attack the floods while they are divided in the various small canyons and the headwaters of the streams before these waters become united and irresistible in the main streams below and also to increase underground storage.

Mr. Frank H. Olmsted, an authority on check dams, says in his reports that if the flood water can be held back by small dams in the canyons, it will never get into the big canyons as a flood. He speaks of experiments made in one small canyon in Los Angeles County, which is 1,000 feet long and drains twenty-two acres, where six log and stone dams, costing but $200 combined, were constructed. It rained considerably during the first half of January of 1916, and the ground was pretty well soaked in this area, as well as elsewhere in southern California. The test came when the big storm of January 16 and 17 broke, yet, despite the downpour, Mr. Olmsted states that there was no suggestion of a stream emerging from the mouth of this canyon. If every canyon had been likewise treated, he believes there would have been no great floods at that time. Similar work has been done in other canyons, with like results. The check dams are not only useful in the prevention of destructive floods but also for increasing the subterranean water supply by reason of the water soaking into the hillsides and finding its way into the underground areas below for use later in the season when required for irrigation. There are several different varieties of these retarding devices.

Major A. A. Fries, United States Government engineer, made an inspection of these check dams after the disastrous floods of January, 1916, and is quoted as saying: "While the principle is not new, I have never seen it so well applied. The work is worthy of careful

study. You have yet to demonstrate how successfully the principle can be applied in the torrent beds across the valleys, but as to the mountain difficulties, it is clear that you are solving the problem."

In Haines Canyon, in Los Angeles County, 384 small checks for retarding velocities were built. The most expensive dam cost $500, the least expensive $5.00, and the average cost of all was $15.62 per dam. The complete control plan of the southern counties includes afforestation, reforestation, impeding and impounding reservoirs, spreading of waters over percolating areas, rechanneling of streams, conduits for conveyance of flood waters from one section to another, riprapping of banks, reinforcement of channels, deepening and widening of channels on the detrital cones at the canyon mouths and on the coastal plains between the sea and the mountains.

# INTERSTATE WATER RIGHTS.

## The Use of Water From One State to Another Is a Coming Policy.

The Water Commission takes the stand that the imaginary boundary lines between states should not interfere with the free use of water from one state to another. It holds that these rights should be reciprocal and that each state will benefit mutually in the exchange. Heretofore, the sentiment and the statutes have been against this broader view, with the result of a great deal of loss to individuals and the states alike. So far as California is concerned, the history of the state shows that much of its growth and prosperity has been due to developments in the bordering states of Nevada and Arizona, particularly in regard to those things requiring the use of water. Since the first discovery of gold in Nevada, and notably since the operation of the claims on the Comstock Lode at Virginia City, the principal beneficiaries of such development, so far as cities are concerned, were the large cities of California, San Francisco during the earlier period, and Los Angeles during the later period, during which time railroads were constructed from the latter city to the mines in the Goldfield region. Today Los Angeles derives a great deal of its business from the neighboring state of Arizona.

Any factor which contributes to the development of the mineral or other resources of either of these border states has a direct and important bearing upon the prosperity of California, and that, in turn, upon the other states at interest. Much of the gold mined in Nevada is invested in California. Activity in mining there has meant, and still means, increased markets for the products of the farms and factories of this state and a greater business for its merchants. As the acquisition of cheap power may be the deciding factor as to whether a mine shall be operated or not operated, a transmission of electric power from California to Nevada will assist in the development of the latter state and, through increased trade, materially aid in the growth of this state, and enhance mutual interests already long established. The same argument is true in the matter of water for agricultural purposes. The commission's idea is, that so far as the public is concerned, the individuals of adjoining states are neighbors, and that the development of the border lands between the two is of equal value to both.

Instances in which interstate rights are involved are:

1. On a boundary stream, such as the Colorado River.
2. Where a stream runs from one state to another, such as the Truckee River.

3. On interstate lakes, such as Lake Tahoe.

4. By canals or ditches running from one state to another.

Some time ago the commission wrote to Mr. John H. Lewis, state engineer of Oregon, asking for his views on the subject, Oregon having taken up the regulation of waters several years prior to this state. The following throws a valuable light on this important question:

MR. W. A. JOHNSTONE,
*President California State Water Commission,*
*San Francisco, California.*

MY DEAR MR. JOHNSTONE:

I am in receipt of your letter with reference to interstate water rights and in reply I am enclosing herewith extracts from the Third Biennial Report of this office, which may be of some interest to you. I am also enclosing copy of Chapter 224, Laws of Oregon for 1911, dealing with the situation in Oregon.

As you probably know, it is my belief that the interstate question will never be settled until we have some federal law governing the distribution of water between the states on interstate streams. We have upper appropriators and lower appropriators on long interstate streams, just as we have upper and lower appropriators in different counties within the state. The upper state, of course, needs no legislation for its protection, but the lower state does.

The Supreme Court of the United States in the case of *Kansas* vs. *Colorado,* held that there must be an "equitable apportionment of benefits" of interstate water as between states. Congress alone can define what this is and provide the necessary machinery to enforce such distribution. However, it will be years before such legislation is provided. In the meantime, some form of reciprocity between states may tend to promote development in the border counties. I therefore recommend the enactment of the law somewhat similar to the Oregon law as enclosed herewith.

I trust that this brief statement may be of some value in connection with your deliberations on this very important subject.

Respectfully yours.

JOHN H. LEWIS,
*State Engineer.*

## DIVERSION OR USE OF WATER MAY BE IN ANOTHER STATE.

(Chap. 224, Laws 1911, Oregon.)

"That no permit for the appropriation of water shall be denied because of the fact that the point of diversion described in the application for such permit, or any portion of the works in such application described and to be constructed for the purpose of storing, conserving, diverting, or distributing such water, or because the place of intended use or the lands to be irrigated by means of such water, or any part thereof, may be situated in some other state, but in all such cases where either point of diversion or any of such works or the place of intended use, or the land, or part of the lands, to be irrigated by means of such water, are situated within the state of Oregon, the permit shall issue as in other cases; *provided, however,* that the state engineer, may in his discretion, decline to issue a permit where the point of diversion described in the application is within the state of Oregon, but the place of beneficial use in some other state, unless, under the laws of such state, water may be lawfully diverted within such state for the beneficial use in the state of Oregon."

## EXTRACT FROM THIRD BIENNIAL REPORT OF STATE ENGINEER OF OREGON.

### Interstate Rights.

The states of Kansas and Colorado have expended eight years' time and over $200,000 in litigation over interstate rights to waters of the Arkansas River which rises in Colorado and flows through Kansas. Property rights in the latter state, it is claimed, have been greatly injured through subsequent diversions in the upper state. The supreme court held in part that the common law doctrine of riparian rights did not apply as between states, and as to the interstate streams, there must be an equitable division of waters. The decision was in many respects disappointing. No practical results were the outcome of this vast expenditure of time and money, and interstate water law is advanced but little.

Oregon will soon be confronted with interstate questions of great magnitude. Already the threatened diversion of Clear Lake in California, which now flows through Langels Valley in Oregon, terminating in Tule Lake in California, is agitating this community, threatening the future possibilities of this beautiful valley. Farther to the east a 100,000-acre State Carey Act project will derive its main water supply by storage in Oregon from drainage area in California and Nevada. A number of smaller conflicts with Nevada are ultimately assured, as well as with California power interests, which may be damaged, perhaps, by the diversion of water for irrigation from Klamath River in Klamath County.

Uncertainties with Idaho already exist. A 60,000-acre Carey Act project in Jordan Valley will derive its water supply from storage just over the line in Idaho. A 20,000-acre irrigation district has been formed in Idaho, its water to be stored on the Owyhee River in Oregon. Another Idaho project will be dependent upon the conservation of the waters of Sucker Creek in Oregon. The Wilson ditch in Malheur County, constructed many years since, to water lands near Ontario, has been rendered almost valueless by subsequent diversions of water from Snake River in Idaho and Wyoming. Oregon has granted water power rights in Snake River at the Ox Bow and other points which at least will cause trouble for subsequent appropriations for irrigation in Idaho and Wyoming.

Irrigators in Washington have appealed to the Board of Control for the protection of their water upon a small stream on which disputes have arisen in Oregon.

We have paid dearly to learn that county control of waters was impossible. After the sacrifice of much valuable time and money, the destruction of interstate rights, the engendering of strife and bad feeling between states, and the retarding of development in the territory tributary to interstate streams, we may learn that state control of all waters within its borders is just as impossible as county control. Streams do not follow county lines any more than they follow state lines. Such a division is impossible. We should be able to store water in Wyoming for the irrigation of lands in Malheur County, using the Snake River as a canal through Idaho, just as we can store water at the head of the John Day River, in Grant County, to be conveyed under state protection through other counties, for use at the mouth of such stream in Oregon. It should be possible to store the flood waters of the Colorado River in the available basins in Colorado, where no use is possible in such state, and convey this water, under United States or interstate protection, for use in southern California. The fullest development of the western states will lag until such time as some legislation is provided affecting the determination, the granting and the protection of interstate rights. We can not expect the United States Supreme Court to work out and adopt some administrative system adequate to the needs in this respect. This is a problem for the legislative branch of the government.

State control should be adhered to as far as possible. This, supplemented by interstate control through agreement between the states, say within the Columbia River basin, may be the final solution. But this probably can never be secured without first submitting to federal control.

The National Irrigation Congress at Boise, Idaho, in 1906, appointed a commission, of which the writer was a member, to investigate this subject and report the

next year at the Sacramento meeting. The views of this meeting of such commission, as herewith presented, are rapidly being accepted by a growing number of people as the only solution of this vexing problem:

"In view of existing conditions which place the burden of the administration of water rights upon the different states, your committee believes and recommends, as do a great many of those answering the interrogatories, that the different states affected by interstate streams take some steps looking to a more uniform system of laws affecting water rights, making those laws of each state agree as nearly as possible with those of sister states and that there should be a general overhauling of all of the laws of the arid states as to the matter of water rights, to the end that litigation of this character of property may be reduced to a minimum, and that the greatest good may come to the greatest number in the matter of the use of water for irrigation.

"While it is true in the administration of water rights upon interstate streams by the different states the right of appeal to the federal courts exists, that remedy is expensive, slow and unsatisfactory. A decision of a court, once rendered, remains fixed and only settles the particular questions involved in that case, while the conditions surrounding irrigation on either side of the state line, are constantly changing and the use of water for irrigation rapidly growing.

"*If there is to be any protection of priorities across state lines, it should be by a federal administrative system corresponding in character to that needed for the establishing and protection of rights within a state.*"

# THE INFLUENCE OF SALT WATER FROM TIDES ON APPROPRIATION OF FRESH WATER.

A new phase of the subject to the general public and to the great majority of persons using water is the comparative effect that the tides have on its use for irrigation in the lower reaches of the rivers. An investigation has been initiated by preliminary tests made by the commission on Suisun Bay. Water from the upper end of this body, into which empty both the Sacramento and San Joaquin rivers, is pumped on the adjacent lands for the irrigation of the ordinary delta land crops of asparagus, celery, beans, sugar beets, etc. During the summer months after July the water becomes brackish, and as the rivers "go down" the saltiness or salinity increases and the water becomes too saline for irrigation—and this at a time when irrigation is still required. This salinity, it has been found, depends on the stages of the rivers and on the tides. The California-Hawaiian Sugar Refining Company at Crockett has determined this in obtaining its supply of fresh water for industrial purposes. This company sends a tank barge up the river and sometimes it is necessary to go as far up as Antioch in order to obtain water out of the reach of tidal influence. The captain takes tests every short distance by chemical means until he finds water fresh enough for industrial use.

The commission has made some tests by the electrolytic method—that is, the degree of salinity is determined by the resistance offered to an electric current passed through a receptacle containing the water to be tested by means of an especially designed apparatus. Although these tests have not been worked out in detail, they show a considerable fluctuation of the salinity of the water at the point taken.

Just what bearing these conditions may have on irrigation is a matter to be decided. Farther up the rivers, above the point where the salinity of the water now makes it unfit for irrigation, thousands of acres of rich land are watered from the streams. In the event of additional appropriations of water and the consequent increased lowering of the stream in the summer season, the question arises as to whether the influence of the tides will encroach farther inland and render water unfit for irrigation that can now be used. This matter serves to indicate one of the many new and important phases of the great water question as it is developing in California through the great use of that commodity and a rapidly increasing demand for more.

# ARM IN ARM WITH UNCLE SAM.

## COOPERATIVE WORK OF THE WATER COMMISSION IN CONNECTION WITH THE UNITED STATES.

In California, as in other states, the federal government maintains organizations for the work in its different departments. Those which particularly concern the Water Commission are the Forest Service, the Geological Survey and the office of Public Roads and Engineering of the United States Department of Agriculture, which latter was popularly known prior to July 1, 1915, as Irrigation Investigations of the the office of Experiment Stations.

### FOREST SERVICE COOPERATION.

The Forest Service has a strong organization in California, presided over by the district forester, under whom are the forest supervisors having immediate supervision of the various national forests in the state. These supervisors in turn exercise authority over the forest rangers who are the "minute men" of the service. These rangers are also the watchmen of the forests, and while there are not as many of them as the service would desire they cover much ground and may be expected to "bob up" anywhere.

Every application for water in which the point of diversion is located in a national forest is, under the cooperative agreement, reported on by the forest ranger to the forest supervisor and thence to the Water Commission. The ranger is the best informed man on the job for first-hand information. He knows the streams in his allotted section like a book, knows the stages of the water at different periods, knows those who are already using it and to what extent, and has much other valuable knowledge. This information is often of utmost assistance in the consideration of applications.

The district forester's office and the Water Commission cooperate in the matter of the use of water for power in the national forests. An applicant must also obtain permission from the federal government in such cases for reservoir sites, rights of way for ditches, pipe lines, etc. If these have not been secured from the national government, the granting of a permit by the Water Commission would be of no avail. Therefore, all concerned are assisted greatly by the close cooperation of these two organizations, as may readily be seen.

### UNCLE SAM'S WATER GAGE.

The water resources branch of the United States Geological Survey may be rightly termed "Uncle Sam's water gage," for it is through

this organization that the waters of the nation, figuratively, trickle and flow on their downward career.

The connection of the Water Commission with the Geological Survey is in reference to stream measurements and stream flow. This cooperation originated in the fall of 1912 with the old State Water Commission, which furnished eight Gurley water-stage registers to be installed on streams for which river profiles were available. The general plans for the installation of recording gages provide for a well on the bank of a stream having inside dimensions of about 3 x 4 feet, extending from above flood stage to a depth sufficient to reach below any possible low water. This well is connected with the river by means of a 4-inch pipe. The gage house or shelter is built directly over the well and of such size as could permit ready access to the instrument. The size of the building in general is about 5 x 6 feet inside.

The commission cooperates with the Geological Survey to the extent of $5,000 per annum, and in the last two years this money has been expended in general on the regular maintenance work connected with the stream-flow investigations in various sections of the state. For this two-year period ending November, 1916, records were obtained at 217 points in California, distributed as follows:

| | Per cent |
|---|---|
| North Pacific drainage | 8 |
| South Pacific drainage | 27 |
| Sacramento drainage | 18 |
| San Joaquin drainage | 34 |
| Great Basin drainage | 13 |

On account of the intensive development in certain sections, there has arisen the necessity for increasing the general accuracy of the work. Marked progress has been made in this direction during the past two years by the use of improved field and office methods, as well as by the installation of more satisfactory station equipment. In all, there are about 30 water-stage recorders in use in this district, including the eight furnished by the Water Commission in 1912. It is the opinion of the district engineer that this number should be steadily increased until at least one station on each of the principal rivers of the state is equipped with one of these self-recording gages. It is by the use of such instruments only that it is practicable to secure a continuous record of stage, which is especially necessary on streams having considerable daily fluctuation. The ability of the Water Commission to call upon the Geological Survey for these stream-flow measurements is of great importance and, economically, is an arrangement of great value to the state. A number of special water resource investigations have been made for the commission, and during the past year reports have been furnished covering the following drainages: Cow Creek, Deer

Creek, sloughs of Sacramento River and diversions from upper Joaquin River. In addition, two gaging stations have recently installed at the request of this commission. All stream-flow re collected are published annually in the series of water supply p by the Geological Survey.

# WATER AND RICE CULTURE.

## Interesting Study of the Use of Water on the Rice Fields of California and Some Figures on Same.

Another one of the cooperative agreements of the Water Commission is that with the office of Public Roads and Rural Engineering of the United States Department of Agriculture, better known as the office of Experiment Stations.

Taking cognizance of the great importance of the rice industries of the state, the Water Commission appropriated money to help defray the expenses of the study of the use of water in the culture of rice. This investigation has been conducted under the immediate supervision of Frank Adams, his office having made a like appropriation to be used along lines mutually agreed upon.

Something of the phenomenal growth of rice culture may be gleaned from the fact that variety tests were first started in the vicinity of Biggs in 1910, and the first commercial crop was grown on 1,400 acres just four years ago, while the year just past showed nearly 70,000 acres under cultivation to this cereal. The total area planted the year before was about 28,000 acres, according to the Rice Growers' Association of California. The total acreage of rice in the United States in 1916 is given as 879,366 acres, divided among the rice-producing states as follows:

| | |
|---|---|
| Louisiana | 446,571 acres |
| Texas | 234,367 acres |
| Arkansas | 121,828 acres |
| California | 69,000 acres |
| Missouri | 200 acres |
| North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi | 7,400 acres |

The industry is of especially great value to California, as it makes possible to put to a profitable use large areas of land which of recent years were not fitted to other crops. Prospective growers have all summer been looking for suitable tracts for rice culture, and the acreage of 1917 will no doubt greatly exceed that of the present year. The figures given by the California Rice Growers' Association for the area planted this year are as follows:

| | |
|---|---|
| Butte County | 30,000 acres |
| Glenn County | 10,000 acres |
| Colusa County | 13,000 acres |
| Yolo County | 10,000 acres |
| Sutter and Yuba counties | 8,000 acres |

Rice is also being grown on scattered areas in the San Joaquin Valley—in Kern, Fresno, Tulare, Kings, Merced and Stanislaus counties, estimated to be between 10,000 and 15,000 acres.

Following is a report based on the work done under the cooperative agreement between the office of Public Roads and Rural Engineering, United States Department of Agriculture, and the State Water Commission:

## REPORT OF MEASUREMENTS OF THE DUTY OF WATER FOR RICE IN SACRAMENTO VALLEY, CALIFORNIA.

By RALPH D. ROBERTSON, Irrigation Engineer.

"Approximately 64,000 acres of rice were irrigated in Sacramento Valley in 1916. Of this area approximately 29,500 acres were irrigated from Sacramento River, approximately 24,000 acres from Feather River, approximately 8,800 acres from minor streams, and about 1,700 acres were irrigated with water pumped from wells. The first commercial crop of rice in California was grown in 1912 on 1,400 acres, and the area in rice in 1916 was over twice that planted in 1915.

"In order to ascertain the amount of water used in growing rice, eighteen representative fields were selected for the purpose of carrying on duty of water investigations. Nine of these fields were located on the west side of Sacramento Valley in the vicinity of Willows, Maxwell and Princeton, and nine on the east side in the vicinity of Biggs, Richvale, Nelson and Marysville.

"The area of the fields studied ranged from 13.95 acres to 1,106 acres and the total area covered in the investigation was 3,305 acres. Ten different soil types were represented. Four fields received water from Sutter-Butte Canal, four from the Hallwood irrigation system, one from Western Canal, seven from Sacramento Valley West Side Canal, one by pumping from Sacramento River, and one by pumping from wells.

"With the exception of two fields where current meter measurements were necessary, and of one field where a submerged orifice was used, all measurements of the water applied were made with weirs and automatic water registers installed at the direct entrance to the fields. Messrs. Hugh S. Patton and Charles L. Kaupke were employed as hydrographers throughout the irrigation season in connection with the investigation, with additional help during part of the season.

"Where water was wasted or drained from a field, an attempt was made to measure or estimate the quantity removed. In many cases there was considerable seepage through the outside levees into adjacent sloughs which could not be measured, and again in some instances the levees were not sufficiently high to prevent water flowing over the tops into neighboring fields or roads. Probably one-third or one-half of the water applied to some fields was lost in this manner.

"Another factor which enters into the use of water is the depth to ground water. Where the water table was about one foot below the surface, as in the case of fields near Biggs, the amount applied was much less than in fields near Willows or Marysville, where the water table was three to twelve feet below the surface.

"There is a difference of opinion among rice growers as to the best manner of irrigating rice. Some claim it is necessary to keep water moving constantly through the fields to prevent stagnation and maintain a vigorous growth of the plant, while others believe that just enough water need be applied to take care of evaporation and maintain a uniform depth over the field. This point, as well as other features of rice irrigation, is being investigated by the office of Public Roads and Rural Engineering in cooperation with the Bureau of Plant Industry.

"Aside from the proximity to sloughs, depth to water table, and manner of irrigating rice, the character of the soil and the preparation of the land play an important part in the use of water.

"The minimum amount of water used on any field was 4.27 acre feet per acre on the Adams field on Stockton clay adobe near Biggs. The maximum net amount used was 14.83 acre feet per acre on the Johnson No. 1 field on Willows loam and Willows clay adobe near Willows. The average depth applied to eighteen fields was 8.23 feet.

"None of the canal companies in Sacramento Valley, with the exception of the Yolo Water and Power Company, which charges $1.50 per acre foot for water, have as yet sold water on an acre-foot basis.

"The Sacramento Valley West Side Canal Company, by authority of the Railroad Commission, charged $7 per acre for rice. For this charge the water user was entitled to five acre feet of water per acre, and additional amounts were charged for at the rate of $1.50 per acre foot. However, no cases are known where charges were made on an acre-foot basis. The Sutter-Butte Canal Company has furnished water to lands having water rights at $5 per acre. Recent contracts made by the company are on the basis of $7 per acre with reimbursements to the water user for the construction of ditches and procuring of rights of way, providing water has been used for more than two successive years. The amount of water called for in their contracts is on the basis of one cubic foot per second for each 53⅓ acres.

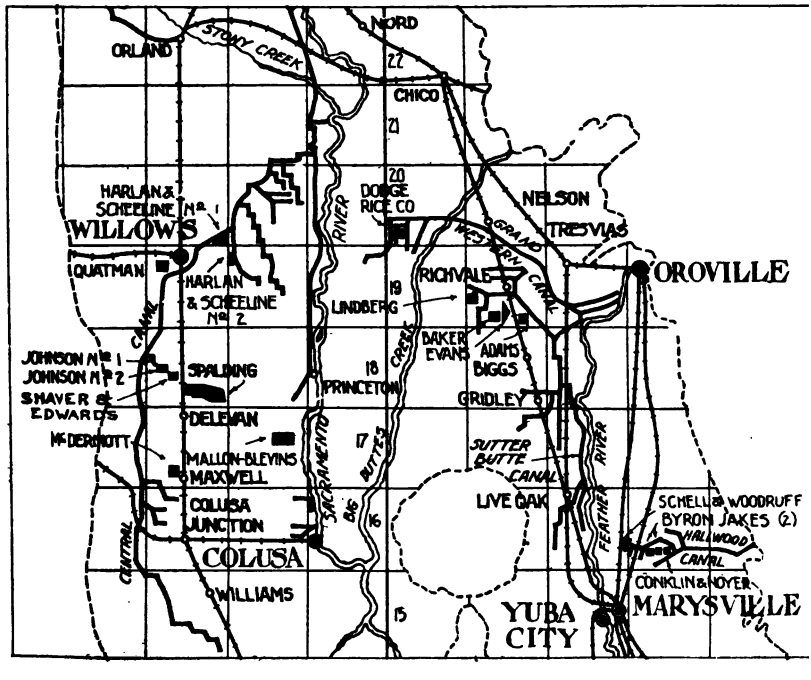
"The irrigation season for rice in Sacramento Valley is divided into two periods. In the first period the rice is irrigated from four to eight times without having water stand on the field. When the rice is about six inches high, which is from about four to six weeks after planting, the fields are kept submerged about six inches deep until the rice is matured. When the heads are turned down and properly filled, the water is removed from the field to permit of harvesting. With one exception, all of the fields studied in 1916 were planted to Wataribune

rice, which is the most widely planted variety in California. The tot length of the irrigation season varied from 155 to 189 days. A varie of Japanese rice known locally as California Pearl on the Dodge Ri Company tract required only 147 days to mature.

"Rice fields are laid off in contour checks ranging from two to five more acres in extent. A few years ago the levees were made with Fres scrapers, but the common practice now is to throw them up with a lar checker or crowder drawn by a tractor.

"The Sutter-Butte Canal Company, which takes its supply fro Feather River, about ten miles above Gridley, served the largest area rice, amounting to 17,000 acres. The Western Canal Company, whi heads on the Feather River shortly above the Sutter-Butte Canal, serv 5,500 acres. The lands served under these two systems are classifi by the Bureau of Soils as Stockton clay adobe. The Sacramento Vall West Side Canal supplied water to 8,500 acres in Glenn and Colu counties. A striking feature here was that considerable land local known as "goose land," and which had heretofore been unutilized exce for scanty pasture, was planted to rice. Other large enterprises whi obtained water by pumping from the Sacramento River were the Mo ton Irrigated Land Company, California Land and Rice Products Co pany, Cheney Slough Irrigation Company, Mallon-Blevin Company, a River Gardens Farms Company."

A summary of the measurements is presented herewith:



## ...ARY OF MEASUREMENTS OF DUTY OF WATER FOR RICE ON EIGHTEEN FIELDS IN SACRAMENTO VALLEY, CALIFORNIA, 1916.

**Cooperation Office of Public Roads and Rural Engineering, United States Department of Agriculture, and California State Water Commission.**

**West Side.**

| Name and location | Area, acres | Soil type | Source of water supply | Date of first irrigation | Date of beginning submergence | Date water turned off | Length of irrigation season, days: Prior to submergence | Length of irrigation season, days: Period of submergence | Length of irrigation season, days: Total | Number of irrigations prior to submergence | Depth of water used prior to submergence, feet | Depth of water used during submergence, feet | Total depth applied, feet | Estimated or measured surface waste, acre feet per acre | Net depth applied, feet | Average area served per cu. ft. per second, acres: Period of submergence | Average area served per cu. ft. per second, acres: Whole season | Approximate depth to ground water, feet: Beginning of season | Approximate depth to ground water, feet: End of season |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Harlan & Scheeline, No. 1: NE. ¼ Sec. 36, T. 20 N., R. 3 W. | 135.60 | Tehama clay loams and clay. | Sacramento Valley West Side Canal. | April 26 | June 21 | Oct. 12 | 56 | 114 | 170 | 9 | 1.95 | 5.85 | 7.80 | 0.00 | 7.80 | 39 | 44 | 6.0 | 4.0 |
| Harlan & Scheeline, No. 2: SW. ¼ Sec. 6, T. 19 N., R. 2 W. | 132.53 | Tehama clay loams and clay. | Sacramento Valley West Side Canal. | May 3 | June 24 | Oct. 22 | 52 | 121 | 173 | 7 | 2.23 | 6.22 | 8.45 | [1] | 8.45 | 38 | 41 | 6.0 | 4.5 |
| Ole Johnson, No. 1: NW. ¼ Sec. 18, T. 18 N., R. 3 W. | 26.26 | Willows loams, Willows clay adobe. | Sacramento Valley West Side Canal. | May 8 | June 14 | Oct. 30 | 37 | 139 | 176 | 4 | 2.69 | 12.14 | 14.83 | [2] | 14.83 | 23 | 24 | 5.5 | 0.5 |
| Ole Johnson, No. 2: SE. ¼ Sec. 18, T. 18 N., R. 3 W. | 75.50 | Willows clay adobe. | Sacramento Valley West Side Canal. | May 17 | July 1 | Oct. 29 | 45 | 121 | 166 | 4 | 1.42 | 5.76 | 7.18 | 0.72 | 6.46 | 49 | 52 | 5.5 | 1.5 |
| M. McDermott: NE. ¼ Sec. 33, T. 17 N., R. 3 W. | 61.00 | Willows loam | Sacramento Valley West Side Canal. | April 19 | May 19 | Oct. 24 | 30 | 159 | 189 | 5 | 1.45 | 10.72 | 12.17 | 3.10 | 9.07 | 42 | 42 | 6.5 | 4.0 |
| Shaver & Edwards: NE. ¼ Sec. 20, T. 18 N., R. 3 W. | 44.85 | Willows loam, Willows clay. | Sacramento Valley West Side Canal. | May 22 | July 6 | Oct. 23 | 45 | 110 | 155 | 5 | 1.00 | 6.58 | 7.58 | 0.90 | 6.68 | 39 | 46 | 6.8 | 3.6 |
| Spalding Company: Secs. 22, 23, 26 and 27, T. 18 N., R. 3 W. | 866.00 | Willows clay | Sacramento Valley West Side Canal. | April 23 | * | Oct. 25 | * | * | 186 | * | * | * | 7.39 | 1.00 | 6.39 | * | 57 | 6.0 | 5.5 |
| A. Quatman: SW. ¼ Sec. 6, T. 19 N., R. 3 W. | 70.15 | Willows clay | Pumping from wells | April 26 | * | Oct. 21 | * | * | 179 | * | * | * | 6.49 | 0.00 | 6.49 | * | 55 | 12.0 | 12.0 |
| Mallon Blevins: Secs. 14 and 15, T. 17 N., R. 2 W. | 1,106.00 | Sacramento clay | Pumping from Sacramento River. | April 17 | * | Sept. 27 | * | * | 164 | * | * | * | 6.71 | 1.30 | 5.41 | * | 61 | 4.0 | 5.0 |

East Side.

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E. L. Adams: NE. ¼ Sec. 34, T. 19 N., R. 2 E. | 39.50 | Stockton clay adobe | Sutter-Butte Canal | April 13 | June 9 | Sept. 30 | 57 | 114 | 171 | 6 | 1.61 | 3.26 | 4.27 | 0.00 | 4.27 | 70 | 80 | 1.5 | 1.0 |
| Baker Bros.: S. ½ Sec. 28, T. 19 N., R. 2 E. | 229.50 | Stockton clay adobe | Sutter-Butte Canal | April 21 | June 14 | Oct. 9 | 54 | 118 | 172 | 6 | 0.82 | 3.84 | 4.66 | 0.00 | 4.66 | 61 | 73 | 1.5 | 1.0 |
| Evans Bros.: SW. ¼ Sec. 22, NW. ¼ Sec. 27, T. 19 N., R. 2 E. | 187.23 | Stockton clay adobe | Sutter-Butte Canal | April 28 | June 17 | Oct. 4 | 50 | 110 | 160 | 7 | 1.14 | 3.66 | 4.80 | 0.00 | 4.80 | 60 | 67 | 1.5 | 1.0 |
| Carl Lindberg: W. ½ Sec. 18, T. 19 N., R. 2 E. | 38.80 | Stockton clay adobe | Sutter-Butte Canal | April 28 | June 13 | Oct. 14 | 46 | 124 | 170 | 6 | 1.91 | 7.44 | 9.35 | [2] | 9.35 | 33 | 36 | 1.5 | 1.0 |
| Dodge Rice Company: N. ½ Sec. 29, T. 20 N., R. 1 E. | 41.00 | Stockton clay adobe | Western Canal | May 3 | July 12 | Sept. 26 | 70 | 77 | 147 | 6 | 2.50 | 5.78 | 8.28 | [3]1.02 | 7.26 | 32 | 35 | 1.5 | 1.0 |
| Conklin & Noyer: SE. ¼ Sec. 27, T. 16 N., R. 4 E. | 36.70 | San Joaquin loam | Hallwood Canal | April 14 | June 13 | Sept. 29 | 60 | 109 | 169 | 5 | 2.33 | 10.08 | 12.41 | 2.41 | 10.00 | 28 | 34 | ------ | 3.0 |
| Byron Jakes (east field): NW. ¼ Sec. 28, T. 16 N., R. 4 E. | 13.95 | San Joaquin loam | Hallwood Canal | April 18 | June 23 | Oct. 9 | 66 | 109 | 175 | 5 | 1.44 | 13.94 | 15.38 | [4]1.95 | 13.43 | 18 | 26 | ------ | 3.0 |
| Byron Jakes (west field): NW. ¼ Sec. 28, T. 16 N., R. 4 E. | 28.00 | San Joaquin loam | Hallwood Canal | April 15 | June 24 | Oct. 10 | 70 | 109 | 179 | 6 | 3.01 | 15.69 | 18.70 | [5]5.88 | 12.82 | 22 | 28 | ------ | 3.0 |
| Schell & Woodruff: W. ½ Sec. 30, T. 16 N., R. 4 E. | 172.00 | Madera clay loam, Madera and Gridley loam undifferentiated. | Hallwood Canal | April 17 | June 16 | Oct. 10 | 60 | 117 | 177 | 5 | 1.73 | 7.89 | 9.63 | [5] | 9.63 | 30 | 45 | ------ | 1.7 |

*Indefinite.
[1]Small loss through outside levee into adjacent slough.
[2]Considerable loss through outside levee into adjacent slough.
[3]Additional loss through outside levee into adjacent slough.
[4]Excessive use caused by porous subsoil.
[5]Considerable loss through and over outside levee into adjacent slough.

## COOPERATION WITH RAILROAD COMMISSION AND COMMISSIONER OF CORPORATIONS.

Under the terms of the Public Utilities Act it is necessary for a water company operating as a public utility to secure a certificate of public convenience and necessity from the Railroad Commission before beginning the construction of a system or extending an existing system. It is likewise necessary for a water company not operating as a public utility to secure a certificate from the Commissioner of Corporations before selling its stock or other securities in raising money to construct its system.

The Water Commission has been cooperating with the two other state offices in determining the amount of water available and the general feasibility of such projects.

## COUNTY COOPERATIVE WORK.

The city and county of Los Angeles has been doing some cooperative work of its own in connection with the Forest Service and the Weather Bureau. The importance of having reliable stream gage and precipitation data on the rivers of the state is becoming more and more realized by public officers in the construction of public works and in the control of flood waters.

As a result of an exhaustive study of damage done by flood waters and of their conservation and control in Los Angeles County, there has been begun a cooperative study of stream discharges from the Angeles National Forest into the stream system of that county, with the collection of extensive precipitation records. This work is being done under the direct supervision of Mr. F. H. Fowler, district engineer of the Forest Service, in cooperation with the officers of the United States Geological Survey and Weather Bureau. The expense is being borne jointly by the federal departments and the county of Los Angeles, the supervisors of the latter having made an appropriation for the work. Realizing the great value in thus securing an adequate and reliable measure of the flood discharges and the waste of waters in this way, extension of this cooperative work is being requested by other counties in the southern part of the state. In Los Angeles County records have been obtained from the following watersheds: Pacoima, Tejunga, Arroyo Seco, Little Santa Anita, Big Santa Anita, Monrovia or Sawpit and San Dimas.

# IRRIGATION DISTRICTS OF CALIFORNIA.

## Including Old and New Ones and List of Most Important Priv Irrigation Enterprises.

The status of irrigation districts in California has changed greatly the past few years. Few of the districts organized under the origi Wright Act succeeded and many were colossal failures, but with all mistakes and losses the fundamental idea seemed to have been corr and has persisted under various changes until found as in the Irri tion District Act of today. Having been amended at various times fr 1887, when it was originally passed, until 1895, it was rewritten in 18 enlarged and reenacted as a new act. Many further amendments h been made since then and numerous supplemental acts have been pass the most recent having to do with the financial and state control featu As shown by Frank Adams, manager of the Office of Public Roads a Rural Engineering, United States Department of Agriculture, this not the form of irrigation organization that is numerically strong in California, nor is it very likely to attain numerical precedence o the cooperative or mutual irrigation company. It is, however, form of organization that is most generally considered, both for r and for the reorganization of old irrigation development, and it is form that has been most largely employed in this state in the most portant new irrigation development and reorganization of the pres decade.

Three additional district acts were passed in 1913, but these w drawn to meet special situations and should not be confused with general California Irrigation District Act of 1897 which is the succes to the old Wright Act.

Up to July 1, 1915, 57 irrigation districts had been organized California since the passage of the Wright Act in 1887, nine of wh were formed since the passage of the rewritten act of 1897. Out of th 57 there are 17 still in existence and 12 are operating. The other five in various stages of reorganization. Since the organization of the Wa Commission the state has witnessed the formation of many new distri and the initiation of a number more, it being only a matter of the nec sary time required to complete the latter before they will take th place in the list of regularly organized districts.

## The Seventeen Old Districts.

The following is a list of the old districts still in existence which were formed under the original Wright Act or its successor:

| District | County | Area in acres |
|---|---|---|
| Anderson-Cottonwood | Shasta and Tehama | 25,000 |
| Brown's Valley | Yuba | 45,000 |
| Oakdale | Stanislaus | 75,000 |
| South San Joaquin | San Joaquin | 70,000 |
| Waterford | Stanislaus | 13,000 |
| Modesto | Stanislaus | 52,000 |
| Turlock | Stanislaus | 175,500 |
| Alta | Fresno and Tulare | 130,000 |
| Tulare | Tulare | 35,000 |
| Alpaugh | Tulare | 2,500 |
| Little Rock Creek | Los Angeles | 4,200 |
| Big Rock Creek | Los Angeles | 700 |
| Black Rock | Inyo | 1,750 |
| Walnut | Los Angeles | 350 |
| La Mesa, Lemon Grove, and Spring Valley | San Diego | 14,750 |
| San Ysidro | San Diego | 475 |
| Imperial | Imperial | 524,000 |

## Irrigation Districts Formed or Initiated Since the Organization of the State Water Commission.

The following table shows the activity in the formation of irrigation districts in the past year and a half since the organization of this commission. In some cases the districts have already been formed, while in others they are in various stages of organization or water has been applied for by individuals acting as trustees for proposed districts. Of those shown in this table only two, namely, the La Mesa, Lemon Grove and Spring Valley and the Oakdale, are applications of previously organized districts applying for additional supply.

| Application No. | Applicant | Source | County | Amount applied for | | Area to be irrigated | Estimated cost | Status |
|---|---|---|---|---|---|---|---|---|
| | | | | Second feet | Storage, acre-feet | | | |
| 8 and 238 | La Mesa, Lemon Grove and Spring Valley | San Diego River | San Diego | 44 | | 14,794 | $1,232,500 | Pending. |
| 32 | Terra Bella | Deer Creek | Tulare | | 25,000 | 12,500 | 900,000 | Pending. |
| 61 | Olaf F. Severson, Tr. | American River | Sacramento | 100 | | 15,000 | | Rejected. |
| 77 and 504 | Oakdale | Highland Creek, Stanislaus River | Tuolumne, Alpine, Stanislaus | | 62,836 | 74,146 | 1,100,000 | Pending. |
| 85a and 85b | Southern Lassen | Long Valley and Last Chance creeks | Lassen | 450 | 119,250 | 22,565 | 600,000 | Pending. |
| 92, 93 and 476 | Paradise | Little Butte Creek, Feather River | Butte | 141 | 23,000 | 11,100 | 500,000 | Pending. |
| 138 | Carmichael | American River | Sacramento | 15 | | 3,100 | 52,250 | Permit issued. |
| 189 | Paul Bresee, Trustee | Colorado River | Riverside | 1,110 | | 177,550 | 8,877,500 | Pending. |
| 228 and 229 | Lindsay-Strathmore | South Fork Kaweah River, North Fork Tule River | Tulare | | 18,000 | 15,500 | 570,000 | Pending. |
| 234 | Madera | San Joaquin, Fresno and Chowchilla rivers, Sand, Cottonwood, Hildreth, Dry and Mariposa creeks | Madera | 5,000 | 380,000 | 400,000 | | Pending. |
| 244 and 454 | Princeton-Codova-Glenn | Sacramento River | Glenn | 200 | | 21,000 | 82,500 | Pending. |
| 269, 280, 281, 293, 426, 427 | Honey Lake Valley | Willow Creek, Susan River, Skeeddaddle Creek, Butte Creek, Horse Lake, Eagle Lake | Lassen | 700 | | 50,000 | | Pending. |
| 301 | Westside | Old River | San Joaquin | 225 | | 11,380 | 285,000 | Pending. |
| 317, 350, 386, 387 | Barclay McCowan, Tr. | Kern River, Caliente Creek and Walker Basin | Kern | 35,600 | 1,000,000 | | | Pending. |
| 353, 354, 355 | Tulare Lake | Kern River, S. Fork Kings River, Tule and Kaweah rivers | Kings | 5,000 | 300,000 | 250,000 | | Pending. |
| 360 | M. F. Tarpey, E. R. Reed et al | Kings River | Fresno, Tulare and Kings | 20,000 | 600,000 | 1,200,000 | | Pending. |
| 364 | Sheep Creek | Sheep Creek and Upper Swearthout Canyon | San Bernardino | 6 | 3,000 | 15,360 | | Pending. |
| 401 and 495 | Long Valley Creek | Long Valley Creek and Little Truckee River | Lassen | 650 | 135,000 | 34,345 | 1,000,000 | Pending. |
| 438 | Mojave River | Deep Creek and W. Fork Mojave River | San Bernardino | 300 | 100,000 | 50,000 | | Pending. |
| 499 and 509 | W. B. Baker, F. H. Merril et al | Whitewater River, Mission Creek, Big, Little and Dry Morongo creeks, Snow, Pipes and Ante- | Riverside | | 240,000 | | | Pending. |

## PRIVATE IRRIGATION SYSTEMS.

The following are a few of the most important of the large number of private irrigation systems in various parts of the state:

### Those Established Prior to Water Commission's Organization.

*San Diego Flume Company.* This system, which is typical of the coast region of southern California, irrigates about 7,000 acres to the north and east of the city of San Diego from the San Diego River and the storage reservoirs.

*Riverside Water Company and Gage Canal Company.* These two systems serve the valuable lands between the south bank of the Santa Ana River and the hills from the section east of Colton, through the Riverside district, in San Bernardino and Riverside counties, but are in no way connected with each other. The value of the entire system, which includes the municipal supply of Riverside, is estimated at $2,500,000, the irrigating portion alone being valued at nearly $1,000,000.

The Gage Canal Company diverts water from the Santa Ana River; its flow is largely augmented during the summer by numerous artesian wells and pumping plants.

*Kern County Land Company.* The Kern County Land Company is interested in numerous canal projects and corporations, taking water from both sides of Kern River, irrigating lands in what is called the Kern delta, lying south, west and southwest of Bakersfield. Of these lands there are about 80,000 acres in alfalfa, 12,000 acres in grain, 10,000 acres in pasture, wild grass, and 15,124 acres in orchards, vines, gardens, etc.

*Kern Valley Irrigation Company.* The Kern Valley Water Company's canal, belonging to Miller & Lux, irrigates the riparian lands lying between Buena Vista Lake and Tulare Lake. About 63,000 acres of this land are in cultivation, mostly in alfalfa.

*Fresno and Consolidated Canals Company.* These two systems, although kept separate, are operated by the same people and cover practically all the irrigated lands in Fresno County, amounting to about 360,000 acres. The points of diversion for the various canals are all along the west bank of the Kings River, close to where it enters the valley.

The Consolidated includes the Fowler switch and the Centerville and Kingsburg canals, as well as a majority of the stock of the Emigrant canal. The latter is on the lower Kings River, and diverts water from the river six miles west of Kingsburg to irrigate lands on the Laguna de Tache Rancho, which belongs largely to this company.

The Consolidated has later priorities on the river, and its flow is cut off from the middle of June to August 1st. The lateral ditches are owned and controlled by the irrigators. No measurements are made

to users, each irrigator taking what he needs in accordance with t rights held by him. Considering its area, it is the most highly develop district in the state.

*The San Joaquin and Kings River Canal and Irrigation Compan* This system diverts water from the west bank of the San Joaquin Riv about one and one-half miles north of the town of Mendota, in Fres County. It is the oldest large canal in the valley, having been orga ized in February, 1871. The area tributary to it extends for seven miles along the west bank of the river, in Fresno, Merced, and Stanisla counties. The company belongs to Miller & Lux, who have ripari rights on the river, and their own lands are very largely included.

*The Crocker-Huffman Land and Water Company*—The Merced Riv furnishes the supply for the 220,000 acres irrigable from its cana These lands extend from the foothills, near where the river enters t valley, to the country surrounding the city of Merced and between th city and Livingston.

*The Butte County and the Sutter County Canals.* These two cana are controlled by the same people, using the same main canal, but a separately incorporated. The Butte canal serves the area in But County and the Sutter canal serves that in Sutter County. This cor bined system covers about 80,000 acres, 30,000 in Butte and 50,000 Sutter County, composed of lands between the Feather River, t Marysville Buttes, and the swamp lands along the Sacramento Riv south to where the slough which leaves the Feather River near Mary ville joins the Sutter basin.

*Sacramento Valley Irrigation Company.* This is an enterprise, back by Eastern financial interests, which have secured the rights of t Central Irrigation District by the purchase of all outstanding distri bonds for 35 per cent of their par value. They have secured contr also, of 100,000 acres in the above district, and are carrying on extensi work in preparing for the irrigation and drainage of the 225,000 ac which will be included in their system.

## Private Irrigation Enterprises Since the Formation of the Water Commission.

The preceding paragraphs give some of the largest of the priva irrigation systems in operation before the commission came into exis ence. Since that time, several private individuals or concerns ha applied to the commission for permits to appropriate water. The are not irrigation districts in the legal sense of the term, but are ente prises by which it is proposed to water large private holdings, or se water to consumers or both. As in all other cases, the commission ca not foretell how many of them will be carried to actual completion, b

their initiation indicates the general irrigation activity in this particular phase. The applications follow:

*The Sutter-Butte Canal Company.* One hundred cubic feet per second of the waters of Hamilton Slough, 40 cubic feet per second of the waters of Old and New Dry creeks, and 20 cubic feet per second of the waters of an unnamed slough, for the irrigation of approximately 16,600 acres of land in the vicinity of Richvale, Biggs and Gridley, in Butte County. Estimated cost, $18,000. (This application is for additional supply for an already established concern.)

*The Cheney Slough Irrigation Company.* One hundred sixty-two cubic feet per second of the waters of the Sacramento River for the irrigation of approximately 10,700 acres of land in the vicinity of Colusa. Estimated cost, $50,000.

*The Panoche Canal Company.* One thousand cubic feet per second of the waters of the San Joaquin River for the irrigation of 77,000 acres of land in Fresno County. Estimated cost, $500,000.

*Earl R. Leib.* Thirty-one cubic feet per second of the waters of Duck Lake, Desolation Lake, Lake Muriel, and two unnamed lakes in Fresno County. It is proposed to divert this water over into the Owens River watershed, to be used for the irrigation of approximately 2,200 acres of land in the Owens River Valley. To compensate for this water, it is proposed to divert water from Thousand Island Lake, Garnet Lake, Lake Italy, Rose Lake, Marie Lake, Wanda Lake, Martha Lake and three unnamed lakes, all in Fresno County. Estimated cost, $35,000.

*The Moulton Water Company.* One hundred sixty-six cubic feet per second of the waters of the Sacramento River, for the irrigation of approximately 15,700 acres of land in Glenn County. Estimated cost, $15,000, in addition to canals and laterals already completed.

*W. F. Fowler.* Two hundred fifty cubic feet per second of the waters of the Sacramento River, for the irrigation of approximately 14,100 acres of land in Glenn County. Estimated cost, $180,000.

*George H. Reed.* One hundred cubic feet per second of the waters of New River, for the irrigation of land in Imperial County. The area to be irrigated and the cost of the proposed project have not been presented.

*The Tulare Water Company.* Two thousand cubic feet per second of the waters of the Kern River, for the irrigation of approximately 78,800 acres in Kern County. Estimated cost, $200,000.

*Leon Bly.* Forty-two cubic feet per second of the waters of Eagle Lake, 500 cubic feet per second of the water of Balls Canyon and Willow Creek, and 20 cubic feet per second of the waters of the Susan River, for the irrigation of approximately 19,200 acres of land in the Honey Lake Valley, in Lassen County. It is proposed to construct a

storage reservoir of approximately 50,000 acre-feet capacity in Balls Canyon. Estimated cost, $300,000.

*M. L. Hazzard.* Two thousand two hundred fifty cubic feet per second of the waters of San Dimas and Cow canyons, for the irrigation of the San Dimas Heights tract in Los Angeles County. Estimated cost, $350,000.

*The Llano Del Rio Cattle Company.* Waters of Big Rock Creek, for the irrigation of approximately 4,700 acres of land in the vicinity of Llano, Los Angeles County. It is proposed to construct a storage reservoir of 7,500 acre-feet capacity. Estimated cost, $130,000.

*Frank K. Mott.* One hundred thousand acre-feet per annum of the waters of Ash Creek, for the irrigation of approximately 50,000 acres of land in Modoc County. Estimated cost, $275,000.

*J. B. Clover.* Eighty thousand acre-feet per annum of the waters of Parsnip Creek and the South Fork of Pit River, for the irrigation of approximately 40,000 acres of land in Modoc County. Estimated cost, $250,000.

*G. H. Ayres.* Seven hundred cubic feet per second of the waters of Cowhead Lake and Twelve Mile Creek, for the irrigation of approximately 40,000 acres of land in Modoc County. Estimated cost, $450,000.

*E. H. Dodge.* Five hundred cubic feet per second of the waters of Leevining Creek, for the irrigation of approximately 50,000 acres of land in Mono County. Estimated cost, $200,000.

*The Mono Canal Company.* Seven hundred fifty cubic feet per second of the waters of Rush and Leevining creeks, for the irrigation of approximately 50,000 acres of land in Mono County. Estimated cost, $500,000.

*The California Farm and Irrigation Company.* Three hundred seventy-five cubic feet per second of the waters of the Colorado River for the irrigation of approximately 59,100 acres of land in the vicinity of Blythe, Riverside County. Estimated cost, $2,300,000.

*The Atascadero Mutual Water Company.* Thirty cubic feet per second of the waters of the Salinas River, for the irrigation of approximately 23,000 acres of land in San Luis Obispo County. It is proposed to store 60,000 acre-feet of water. Estimated cost, $750,000.

*E. G. Hopson.* Forty cubic feet per second of the waters of Cow Creek for the irrigation of approximately 3,000 acres of land in Shasta County. Estimated cost, $100,000.

*E. W. Pereira.* One hundred twenty-five cubic feet per second of the waters of Scott River, for the irrigation of approximately 10,000 acres of land in Siskiyou County. Estimated cost, $48,500.

*E. G. Hopson* and *A. L. Conrad.* One hundred thirty cubic feet per second of the waters of Red Bank Creek, for the irrigation of approxi-

mately 10,000 acres of land in Tehama County. It is proposed to store 30,000 acre-feet of water. Estimated cost, $400,000.

*The Sespe Light and Power Company.* Two hundred fifty cubic feet per second of the waters of Sespe Creek, for the irrigation of approximately 50,000 acres of land in Ventura County. Estimated cost, $3,000,000.

*R. Whitehead.* One hundred fifty cubic feet per second of the waters of the Feather River and Plumas Lake, for the irrigation of approximately 6,300 acres of land in Yuba County. Estimated cost, $50,000.

*The Farm Land Investment Company.* One hundred fifty cubic feet per second of the waters of the Feather River, Plumas Lake and Messick Lake, for the irrigation of approximately 6,400 acres of land in Yuba County. Estimated cost, $31,000.

# A NOTABLE CASE.

**Spring Valley Water Company and Alameda County Water District Ask Commission to Settle Their Long Drawn Out Differences.**

Some idea of the importance of the work and the scope of the Water Commission may be had from what is considered one of the most notable matters which has come before the commission since its organization, namely, the submission to it, as referee, of the long drawn out troubles and litigation between the Spring Valley Water Company of San Francisco and the Alameda County Water District of Alameda County.

Resulting from an injunction obtained by the water district to prevent the Spring Valley Company from taking more water or maintaining storage reservoirs on Alameda Creek, an agreement was signed by these two parties on September 1, 1916, to refer the controversy to the State Water Commission for arbitration. By this agreement the commission is allowed a three-year period to investigate physical conditions in the territory involved and to collect data for reaching an intelligent and fair determination of the conditions upon which the water company may increase its diversions or store water with due regard to the rights of the landowners in the district. The object of the agreement is to reach a settlement whereby it shall be made possible to conserve and use waters, which are not now beneficially used, without damaging the underground water supply of the lands in the district; or, if it is not possible to prevent such damage entirely, to compensate the owners of the damaged land to the extent such damage is not prevented, the water company to make such compensation as a condition of the exercise of any rights or privileges accorded to it by such settlement. Under the terms of the agreement, funds amounting to $10,000 per annum were placed at the disposal of the commission for this purpose by the Spring Valley Water Company.

The Alameda County Water District is an organization of owners of about 53,000 acres in the vicinity of Niles. The area lies west of the town, between the foothills of the Coast Range Mountains and San Francisco Bay. It includes the towns of Niles, Irvington, Centerville, Newark, Alvarado and Decoto. Its boundaries are the supposed limits of the influence of Alameda Creek upon the ground waters from the bay shore region.

This territory is very productive and land values are high, being planted to orchards, gardens and a considerable acreage to sugar beets, while toward the bay the land is used largely for dairying.

From 1910, when it is estimated that there were less than 800 pumping wells in the district, the number has increased to approximately 1,400 at the present time.

The lower reaches of Alameda Creek traverse the northerly portion of the district and are regarded by the district as a chief source of replenishment to the ground waters of this territory. The flow of the creek is exceedingly variable, reaching a volume of as high as 20,000 second-feet for winter periods, falling to a very few second-feet in the summer.

The Spring Valley Water Company owns large holdings on Alameda Creek and its tributaries, particularly on the upper watershed. It has also acquired many water rights along the entire course of the channel. Preparations are being made to increase its diversions by construction of a storage reservoir on Calaveras Creek, just below its junction with the Arroyo Hondo which takes its rise near Mount Hamilton, Santa Clara County. The construction of the dam for this reservoir will probably be completed in 1918.

The importance of these investigations of the underground waters of the Niles "Cone" may be understood when it is realized that the study of underground waters is comparatively in its infancy. The Geological Survey has conducted certain studies, but they have been along far more general lines than are contemplated in this particular investigation. The result, therefore, of the findings of the Water Commission will no doubt be of general interest and will be watched very carefully by engineers and all interested in the use of water. The comparatively sparse settlement of the country and the heretofore sufficient supply of surface waters has not demanded the attention that will finally have to be paid to underground waters in the future. The Niles "Cone" investigations, therefore, promise to be of great value to the existing knowledge on an increasingly important subject.

# ASCERTAINMENTS AND ADJUDICATIONS.

## A Matter of Much Importance That Will Be Furthered by the Passage of Amendments to the Present Act.

The Water Commission Act gives the commission authority to ascertain the relative rights of the various claimants to the use of water from a common source of supply. To become binding, such ascertainment must be approved by a superior court in an action initiated either by the state or by one of the claimants. The court may also approve the ascertainment in a modified form. Through this action by the court the ascertainment becomes an adjudication.

For reasons given in this report under the caption "Discussion of the Necessity of the Foregoing Proposed Amendments," the commission has undertaken no regular ascertainments under the terms of section 24. It has uniformly advised those seeking an ascertainment to bring action in the regular way and ask that the matter be referred to the commission for investigation as referee.

Judge Burroughs of the Superior Court of Lassen County has referred to the commission the following three cases:

*August Anderson* vs. *Union Land & Stock Company;*
*McKissick Cattle Company* vs. *Union Land & Stock Company et al.;*
*Johnson et al.* vs. *Hill.*

The first two cases deal with the waters of Red Rock Creek and the third with the waters of Willow Creek, both in Lassen County.

Engineers of the commission have made hydrographic surveys of each of the two stream systems. The completed reports will be submitted to the court as evidence of the physical data involved.

# HOW AN APPLICATION IS ACTED UPON.

**Progress of an Application Through the Commission. Of Interest to Prospective Appropriators.**

An application to appropriate water under the terms of the Water Commission Act takes the place of the notice of appropriation provided for in section 1415 of the Civil Code. Just as the date of posting notice fixed the priority of the old right, so the date of filing application in the office of the Water Commission fixes the priority of the new right.

The everyday routine work of the commission is that of "acting upon" applications from the time that they enter the secretary's office until they are finally approved, withdrawn or rejected, as the case may be. It is an interesting procedure, both to the average person desirous of information and to prospective applicants. The work calls for many activities in various directions: checking, examinations, investigations, computations, field work from an engineering standpoint, legal considerations, correspondence, systematization, and a host of other phases follow the progress of an application through the commission.

When an application is first received it undergoes a general checking up. Some applications are in form, but very few of them. A great majority are defective in some or many particulars. The work then is to get these perfected, and to do so while not holding up the work and consideration on the application as a whole. There are many things which are attended to while awaiting the information on those points which are incorrect or lacking. The amount of water which an applicant asks permission to use is in many cases out of all proportion to his requirements. As in the filing of old notices of water appropriation, some seem to conclude that the more they ask for the better, and that they may as well have more than enough, without considering what such a condition would finally lead to. The commission endeavors to determine the amount of water that can be actually placed to beneficial use in each particular case, and this often requires a great deal of correspondence or investigation of one kind or another to determine. Although the commission has practically standardized the amount of water required to irrigate an acre of land for usual culture under normal conditions, still no two applications are exactly alike, and each must have its own special consideration.

A great deal of effort is often expended in getting an applicant to properly locate his point of diversion, that point from which he takes his water from a stream or other source. If this point is not fixed with

some degree of exactness, future trouble may ensue over the water right. As the expense of an actual survey might be very burdensome to the small user, the rules and regulations governing applications specifically state that surveys need not be made in connection with applications for three cubic feet per second or less. In cases of large appropriations, much labor is required in the examination of the data of the whole project, which may be a big power, irrigation, mining or municipal enterprise. Through the cooperation of the commission with various other agencies a great many applications require that matters relating to them be taken up with these agencies. If the application is for power, the District Forester of the United States Forest Service must be notified, and if an application for any purpose is within a national forest certain information is asked of the Forest Supervisor. By working arrangement with the United States Geological Survey stream measurements and flow may have to be obtained.

When an applicant applies for the use of water, his application immediately becomes of importance to others on the same stream who have appropriated water before him. For that reason the commission attempts to get information in regard to as many of these prior appropriators as possible for the purpose of sending them notices that application has been made. In many cases this is difficult or impractical. The applicant himself is requested to give the names of as many as possible of these prior appropriators who may be below his proposed point of diversion, but in many instances he does not know, nor has he the means to ascertain. The postmasters at the various offices nearest the points of diversion specified in applications are requested to post in prominent places in their offices forms of notices sent out by the commission, and these usually give excellent results. These notices ask prior appropriators to make protests, if they have any, against the appropriation in question in order to assist the commission in determining if any unappropriated water exists. This procedure is a matter of "safety first" for the applicant, for it behooves him to know before incurring great expense just what the conditions are which surround him. This process may also save much litigation to all concerned, and this has been one of the important and fixed policies of the commission —that, as a public body representing the people, it shall endeavor in every manner possible to clear up misunderstandings and possibilities of future litigation and bring about satisfactory compromises.

Many of the applications before the commission are for the waters of springs and small mountain streams or washes for the irrigation of homestead or desert land entries. Where the approval of such applications will not interfere with other users, the commission issues a permit even though it be known that the water supply is deficient. This is done on the theory that such entrymen should be allowed to do what

they can with the source of supply. The attitude of the commission is different, however, in regard to those enterprises where parties other than the applicant are to use the water appropriated. In such cases the commission will refuse to grant the permit unless it is reasonably certain that sufficient water is available to make the project feasible.

In issuing a permit definite dates are fixed for the beginning of construction, for the completion of construction and for the complete application of the water appropriated to beneficial use. It is within the powers of the commission to revoke a permit in cases where reasonable diligence is not being exercised in construction work. The idea of "holding water rights" without pushing construction work in a businesslike manner thus becomes a mere fiction. When the construction work has been completed and the water applied to a beneficial use, an investigation is made by a representative of the commission, and, if the conditions of the permit have been reasonably fulfilled, a license is issued.

### APPLICATIONS UNDER SECTION TWELVE.

Section 12 of the Water Commission Act authorizes the commission, upon the application of any appropriator of water under an appropriation made and maintained according to law prior to the passage of the act, to prescribe the time within which the full amount of water appropriated shall be applied to useful or beneficial purposes.

But six applications have been made under this section, two of which have been granted, two rejected and two are still pending.

In passing upon such applications the commission is restricted to the matter of reasonable diligence and can not go into the question of water supply or feasibility of the project. The attitude of the commission towards reasonable diligence in construction work is clearly shown elsewhere in this report under the caption of "Water Rights in California."

PLATE VIII.

Uses of water—municipal supply. Dulzura conduit at Barrett dam site, Cottonwood Creek. Water supply system, city of San Diego.

Uses of water.—Hydraulic mining still practiced where it does not affect navigation, such as on the Trinity River.

# TABULATED LIST BY COUNTIES OF APPLICATIONS SUBMITTED TO THE COMMISSION.

**Showing Every Application Submitted to the Commission and Information Regarding Same.**

Up to December 1, 1916, the commission has received 531 applications for the appropriation of water: 435 for agricultural purposes, 55 for mining, 34 for power and 7 for municipal. Permits have been granted for 192 applications, 39 applications have been withdrawn by applicants, 50 rejected by the commission, and the remaining 250 are now pending in various stages. Of the applications on which permits have been granted, 162 are for agricultural purposes, 23 for mining and 7 for power. On four applications on which permits have been granted construction work has been completed and the water applied to the proposed use and licenses have been granted. Three of these licenses are agricultural and one power.

While California ranks first in mining and second in electric power of the states of the union, the greatest recent development since the organization of the Water Commission has been along irrigation lines. A glance at the map in this report, which gives the applications of all classes and their locations, together with the tabulation of said applications by counties, on the following pages, will show that over 90 per cent of all water applied for has been for irrigation as follows:

| | |
|---|---|
| For irrigation, 91,360 second-feet | 93.0 per cent |
| For power, 4,892 second-feet | 5.0 per cent |
| For mining, 1,624 second-feet | 1.7 per cent |
| For municipal, 257 second-feet | 0.3 per cent |

The map shows the sections of the state which have been most energetic in their demands for water, and it must be remembered that this is the demand only for the past year and a half. Thousands of water rights were in existence before the organization of this commission, of which no record is here given.

Many of the large projects which are shown as pending are necessarily slow in procedure, due to the amount of preliminary investigation and work required and the expenditures involved. The unsettled status of world affairs generally has interfered with the perfection of many of these larger enterprises. However, their initiation gives some

indication of the vast amount of activity which is to follow in the prosecution of these projects and of the consequent prosperity of the state. This prosperity will finally be greatest in the intensified production of the lands brought under irrigation which will be permanent, but current prosperity is indicated in several directions as a result of employment of labor, use of construction materials of various kinds, transportation, machinery and equipment of various characters, and supplies of many kinds incident to such activities. In addition, many large enterprises have no doubt been deterred from being initiated on account of unstable conditions, which will later be carried to completion. The estimated expenditures on some of these projects alone run into millions of dollars, which gives some idea of the magnitude of all of these contemplated activities combined.

A glance at the tabulation of the counties of Butte, Glenn, Colusa, Yolo, Sutter and Yuba will show something of the extent of the new rice culture in the state, these being the six principal rice counties, and diversions of water therein have been mostly for culture of that cereal. However, Kern, Fresno, Tulare, Kings, Merced and Stanislaus counties have some diversions for this purpose, although in these latter sections most of the rice is being irrigated from previous diversions or from wells.

In the tables given the cost of many of the diversions can not be accurately obtained from the column headed "Estimated Cost." These costs may be approximate in the case of enterprises requiring detailed engineering data, but in many of the others the estimates bear no correct relation to the number of acres to be irrigated as shown by the average cost of putting water on land. For instance, the applicant may state the estimated cost of his expenditure for irrigating 300 acres of land as $300, or $1.00 per acre. This may include only just such material as he has to buy outright for cash, not counting the labor which he may perform himself. Or it may be that he already has water on his land and is applying for an additional amount required and has already constructed the necessary works, and the estimated cost given by him is for such additional equipment as he will have to provide. However, he states in his application the total number of acres he is watering, which does not give the true idea of the proper cost to irrigate the amount of land specified.

In many cases, as the tables will show, application is made for a larger amount of water than the applicant requires for the acreage he proposes to irrigate. In other words, the relationship of the duty of water to the area to be irrigated is out of proportion. This, however,

is corrected by the commission which, in issuing a permit, takes into consideration the duty of water as required by the particular case and allows applicant the proper amount of water accordingly.

Following is a complete list of the applications for all purposes submitted to the commission since its organization in March, 1915, to December 1, 1916, the list being arranged by counties for easy reference:

## ALAMEDA

| Application No. | Permit No. | Applicant | Source | Agricultural: Second feet | Agricultural: Acres |
|---|---|---|---|---|---|
| | | None | | | |

## ALPINE

| | | | | | |
|---|---|---|---|---|---|
| 77 | | Oakdale Irrigation District | Highland Creek | | 74,146 |
| 77a | | Utica Gold Mining Co. and Hobart Estate Co. | Highland Creek | | |

## AMADOR

| | | | | | |
|---|---|---|---|---|---|
| 159 | | John Sherman Bagg | Mokelumne River | | |

## BUTTE

| | | | | | |
|---|---|---|---|---|---|
| 10 | | J. M. Shannon and M. B. Pulley | Butte Creek | | 750 |
| 40 | | Sacramento Valley Rice Co. | Old Dry Creek | 20 | 480 |
| 83 | 10 | J. W. Thatcher, H. M. Thatcher and H. C. Hansen | Empire Creek | | |
| 92 | | Paradise Irrigation District | Little Butte Creek | 66 | 11,100 |
| 93 | | C. S. Compton, D. L. Whisman and C. M. Burket | W. Branch Feather River | 75 | 10,000 |
| 123 | 68 | Eugene Rutherford | Hamilton Slough | 10 | 640 |
| 150 | | J. F. Littlefield | Middle Butte Creek | | |
| 200 | | Sutter-Butte Canal Co. | Hamilton Slough | 50 | 8,000 |
| 206 | | J. W. Browning | Butte Creek | | 3,200 |
| 208 | | Sutter-Butte Canal Co. | Hamilton Slough | 50 | 4,500 |
| 209 | | Sutter-Butte Canal Co. | Unnamed slough | 20 | 1,090 |
| 210 | | Sutter-Butte Canal Co. | Old and New Dry creeks | 40 | 3,000 |
| 429 | | Eugene Rutherford | Unnamed slough | 10 | 560 |
| 476 | | Paradise Irrigation District | Little Butte Creek | 66 | 11,100 |
| 502 | | A. C. Tucker | Berry Creek | 1 | 160 |

## CALAVERAS

| | | | | | |
|---|---|---|---|---|---|
| | | None | | | |

## COLUSA

| | | | | | |
|---|---|---|---|---|---|
| 18 | 29 | J. F. Mallon and R. E. Blevins | Sacramento River and Colusa Basin | 130 | 5,240 |
| 22 | | The Melone Company | Colusa Basin | 18 | 1,100 |
| 27a | 32 | Moulton Water Co. | Sacramento River | 31 | 3,380 |
| 186 | 72 | Blevins & Mallon Ditch Co. | Sacramento River | 42 | 1,800 |
| 190 | | Mrs. B. Graham | Sacramento River | 31 | 1,100 |
| 230 | | Cheney Slough Irrigation Co. | Sacramento River | 162 | 10,660 |
| 236 | | James Mills Orchard Corp. and Esperanza Land Corp. | Stone Corral Creek | 20 | 4,820 |
| 241 | | The Melone Co. | Colusa Basin | 18 | 960 |
| 279 | 92 | George Allen | Recl. Dist. 108 Drain. Ditch | 3 | 140 |
| 297 | 101 | G. W. Pratt | Sycamore Slough | 3 | 250 |
| 380 | 170 | Ulysses S. Tolbert | Grapevine Creek | 0.25 | 20 |
| 416 | | James Mills Orchard Corp. and Esperanza Land Corp. | Stone Corral Creek | 20 | 4,820 |

## CONTRA COSTA

| | | | | | |
|---|---|---|---|---|---|
| 411 | 177 | Oscar H. Hershey | Springs and flood waters | | 20 |
| 412 | 178 | Katherine B. Hershey | Spring and flood waters | | 5 |
| 465 | | Peoples Water Co. | San Pablo Creek | | |

| Municipal | | Mining | | Power | | Storage, acre feet | Estimated cost | Status |
|---|---|---|---|---|---|---|---|---|
| Second feet | Population | Second feet | Character | Second feet | Theoretical h.p. | | | |
| **COUNTY.** | | | | | | | | |
| | | | | | | 62,836 | $1,100,000 | Pending. |
| | | | | | 19,000 | 62,836 | 1,100,000 | Pending. |
| **COUNTY.** | | | | | | | | |
| 200 | 500,000 | | | | | | | Rejected. |
| **COUNTY.** | | | | | | | | |
| | | | | | | | | Rejected. |
| | | | | | | | $3,600 | Withdrawn by applicant. |
| | | 5 | Placer | | | | 1,500 | Permit issued. |
| | | | | | | 6,600 | 250,000 | Pending. |
| | | | | | | 3,487 | 150,000 | Pending. |
| | | | | | | | 200 | Permit issued. |
| | | 2.5 | Drift gravel | | | | 2,500 | Withdrawn by applicant. |
| | | | | | | | 3,000 | Pending. |
| | | | | | | | | Withdrawn by applicant. |
| | | | | | | | 6,000 | Pending. |
| | | | | | | | 2,000 | Pending. |
| | | | | | | | 7,000 | Pending. |
| | | | | | | | 2,000 | Pending. |
| | | | | | | 19,600 | 350,000 | Pending. |
| | | | | | | | 270 | Pending. |
| **COUNTY.** | | | | | | | | |
| | | | | | | | | |
| **COUNTY.** | | | | | | | | |
| | | | | | | | $52,000 | Permit issued. |
| | | | | | | | | Rejected. |
| | | | | | | | 4,000 | Permit issued. |
| | | | | | | | 11,000 | Permit issued. |
| | | | | | | | 5,500 | Permit issued. |
| | | | | | | | 50,000 | Pending. |
| | | | | | | | | Withdrawn by applicant. |
| | | | | | | | 5,000 | Pending. |
| | | | | | | | 1,000 | Permit issued. |
| | | | | | | | 1,000 | Permit issued. |
| | | | | | | | 100 | Permit issued. |
| | | | | | | | 26,500 | Pending. |
| **COUNTY.** | | | | | | | | |
| | | | | | | 4 | $500 | Permit issued. |
| | | | | | | 1 | 150 | Permit issued. |
| | 325,000 | | | | | 40,000 | 2,000,000 | Pending. |

## DEL NORTE

| Application No. | Permit No. | Applicant | Source | Agricultural | |
|---|---|---|---|---|---|
| | | | | Second feet | Acres |
| 78 | ------ | J. R. Harvey | Illinois River | | |
| 205 | 87 | M. D. Graham | Growler Gulch | | |
| 221 | 84 | Chapman, Cook, Graham, Dressler & Sasse | Davis Gulch | | |
| 248 | ------ | M. D. Graham | Haden Gulch | | |
| 339 | ------ | Harry Pattison | Haden Gulch | | |
| 403 | ------ | M. D. Graham | Granite Gulch | | |
| 493 | ------ | Ewen Cameron | Coon Creek | | |

## EL DORADO

| | | | | | |
|---|---|---|---|---|---|
| 5 | ------ | George H. D. Meyers | Unnamed stream | | 160 |
| 6 | ------ | George A. Newhall | Lonely Gulch Creek | | |
| 41 | 9 | Geo. M. Dyke, Al Valliere, Joe Elvidge | American Canyon | | |
| 87 | 19 | W. W. Price | Eau Claire Creek | | |
| 116 | ------ | Walter J. Harris and Joseph M. Short | McKinney Lake and creek | 2.5 | 190 |
| 141 | 191 | A. S. Mangrum | Cathedral Creek | 0.2 | |
| 152 | 43 | Walter K. Fisher | | 0.025 | |
| 256 | ------ | E. R. Walker | South Fk. American River | 200 | |
| 408 | ------ | H. Law and N. L. Salter | Unnamed stream | | |
| 477 | ------ | A. L. Richardson | Eagle Creek | | |

## FRESNO

| | | | | | |
|---|---|---|---|---|---|
| 23 | ------ | Panoche Canal Co. | San Joaquin River | 1,000 | 77,000 |
| 191 | 105 | Samuel P. Hale | Jackson Creek | 2.2 | 170 |
| 191a | 106 | Samuel P. Hale | Hale's Creek | 2.2 | 170 |
| 211 | 74 | John M. Akers | Spring | 0.002 | |
| 258 | 142 | Hill Valley Farms Co. | Hills Valley Creek | 2 | 160 |
| 289 | 99 | Charles Koppka | Martinez Creek | 2 | 160 |
| 360 | ------ | M. F. Tarpey, E. R. Reed et al. | Kings River | 20,000 | 1,200,000 |
| 367 | ------ | Earl R. Lieb, John P. Burke et al. | Duck Lake, Desolation Lake, Lake Muriel and two unnamed lakes | | |
| 400 | ------ | Earl R. Lieb, John P. Burke et al. | Thousand Island Lake, Garnet Lake, Lake Italy, Rose Lake, Marie Lake, Wanda Lake, Martha Lake and three unnamed lakes | 31 | 2,160 |
| 381 | ------ | James J. Sparr | Spring | | |
| 388 | ------ | L. A. Nares and I. Tellman | Kings River | | |
| 451 | ------ | John H. Nichols | Etchegoing Creek | 3 | 120 |
| 506 | ------ | City of Coalinga | Waltham Creek | | |

## GLENN

| | | | | | |
|---|---|---|---|---|---|
| 27 | 31 | Moulton Water Co. | Sacramento River | 166 | 15,720 |
| 244 | ------ | J. Overholtzer | Sacramento River | 140 | 14,000 |
| 454 | ------ | J. Overholtzer | Sacramento River | 60 | 7,000 |
| 462 | ------ | W. F. Fowler | Sacramento River | 250 | 14,120 |

## HUMBOLDT

| | | | | | |
|---|---|---|---|---|---|
| 76 | 12 | John Holst | Reas Creek | 0.6 | 46 |
| 145 | 36 | L. J. Stone | Soldier's Grove Spring | | |
| 242 | 169 | J. R. Gilbert | Leavy Gulch | | |
| 255 | ------ | Walter and Christian Terkelsen | Williams Creek | 1.5 | 40 |
| 347 | 128 | A. E. Petersen | Coffee Creek and trib. | 0.9 | 70 |

COUNTY.

| Municipal | | Mining | | Power | | Storage, acre feet | Estimated cost | Status |
|---|---|---|---|---|---|---|---|---|
| Second feet | Population | Second feet | Character | Second feet | Theoretical h.p. | | | |
| | | | | | | | | Rejected. |
| | | 8 | Placer | | | | $250 | Permit issued. |
| | | 3 | Placer | | | | 1,500 | Permit issued. |
| | | 1 | Placer | | | | 250 | Rejected. |
| | | 3 | Hydraulic | | | | 600 | Pending. |
| | | 3 | Placer | | | | 1,500 | Permit issued. |
| | | 50 | Hydraulic | | | | 25,000 | Pending. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Withdrawn by applicant. |
| | | | | 5 | 25 | | $5,000 | Withdrawn by applicant. |
| | | 2.5 | Placer | | | | 300 | Permit issued. |
| | | | | 2 | 13 | 10 | 500 | Permit issued. |
| | | | | | | 42 | 6,000 | Pending. |
| | | | | | | | 100 | Permit issued. |
| | | | | | | | 75 | Permit issued; License No. 2 issued. |
| | | | | | | 50,000 | | Pending. |
| | | | | 0.25 | 10 | | 2,100 | Pending. |
| | | | | 1.5 | 10 | | 1,200 | Pending. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | $500,000 | Pending. |
| | | | | | | | 1,000 | Permit issued. |
| | | | | | | | 1,000 | Permit issued. |
| | | | | | | | 700 | Permit issued. |
| | | | | | | | 500 | Permit issued. |
| | | | | | | | 200 | Permit issued. |
| | | | | | | 600,000 | | Pending. |
| | | | | | | 20,400 | 35,000 | Pending. |
| | | | | | | | | Withdrawn by applicant. |
| | | | | 2,000 | 20,000 | 600,000 | 6,000,000 | Pending. |
| | | | | | | | 235 | Pending. |
| 3 | 3,500 | | | | | | 50,000 | Pending. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | $15,000 | Permit issued. |
| | | | | | | | 17,500 | Pending. |
| | | | | | | | 15,000 | Pending. |
| | | | | | | | 180,000 | Pending. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | $25 | Permit issued. |
| | | 0.1 | Milling | | | | 450 | Permit issued. |
| | | 4.0 | Placer | | | | 1,000 | Permit issued. |
| | | | | | | | 600 | Pending. |
| | | | | | | | 300 | Permit issued. |

**IMPERIAL**

| Application No. | Permit No. | Applicant | Source | Agricultural | |
|---|---|---|---|---|---|
| | | | | Second feet | Acres |
| 104 | 158 | Henry J. Lawrence et al | Palo Verde Lagoon | 21.5 | 1,720 |
| 262 | ------ | Claudie A. Strabley | Carlso Creek | 1.25 | 160 |
| 485 | ------ | George H. Reed | New River | 100 | ---------- |
| 489 | ------ | Ella J. Bowles | Palo Verde Lagoon | 3 | 160 |

**INYO**

| | | | | | |
|---|---|---|---|---|---|
| 3 | ------ | C. T. Fitzhugh | Cartago, Olancha, Walker and Falls creeks | 5 | 320 |
| 14 | ------ | Ira J. Burnett | Inyo Creek | 2 | 90 |
| 17 | ------ | F. E. Van Cleave | Carrol Creek | 4 | 320 |
| 31 | 14 | Olive R. Wilson | Five Mile and Dead Foot creeks | 2 | 320 |
| 35 | ------ | A. L. Myers | Nine Mile Canyon | ---------- | ---------- |
| 36 | ------ | F. E. Banks | Richter Creek, Diaz Lake | 0.5 | 40 |
| 39 | 15 | E. B. Hannsen | Slide Creek and springs | 2.5 | 200 |
| 48 | 42 | H. D. Porter | Willow Springs | 0.1 | 5 |
| 59 | ------ | Symmes Creek Dev. Co. | Symmes Creek | 10 | 520 |
| 102 | 16 | Charles R. Dugan | Unnamed spring | 1.25 | 120 |
| 114 | ------ | Johann Albars | Bishop Creek | 3 | 40 |
| 117 | ------ | George C. Keough | Ham Canyon | 3 | 130 |
| 125 | ------ | Mary M. Celaya | Lone Pine Creek | ---------- | ---------- |
| 132 | ------ | Samuel Howard | Scotty's Spring | 1 | 80 |
| 147 | ------ | City of Los Angeles | Big Pine Creek | ---------- | ---------- |
| 148 | ------ | City of Los Angeles | Cottonwood Creek | ---------- | ---------- |
| 160 | ------ | J. Asher Cowan | Willow Springs | ---------- | ---------- |
| 175 | 78 | W. H. Jones | Nine Mile Spring | 1 | 80 |
| 196 | 79 | John C. Baxter | Nine Mile Creek | 3 | 320 |
| 217 | ------ | Death Valley Cons. Mines Co. | Willow Creek | ---------- | ---------- |
| 220 | ------ | Edward E. Elder and F. L. Young | Panamint Canyon | 2.5 | 320 |
| 265 | ------ | O. C. Johnson, W. K. Miller and H. Dearborn | Coal Kiln Springs | 0.25 | ---------- |
| 286 | ------ | O. C. Johnson, W. K. Miller and H. Dearborn | Anvil Springs | 0.25 | ---------- |
| 287 | ------ | O. C. Johnson, W. K. Miller and H. Dearborn | South Park Spring | 0.25 | ---------- |
| 300 | 153 | Coso Milling Co. | Coso Canyon | ---------- | ---------- |
| 305 | ------ | F. E. Banks | Richter Creek | 1 | 80 |
| 332 | 148 | Harvey H. Hall | Unnamed springs | 1.25 | 160 |
| 341 | ------ | American Trona Corp. | Joe Peterson Creek, Willow Creek, Argus Creek, Parsons Cr. and springs | ---------- | ---------- |
| 389 | 185 | George J. Evans | Hemstead Spring | 1.5 | 320 |
| 428 | ------ | A. Shelly | Funnel Lake Springs | 2 | 160 |
| 432 | ------ | R. D. Owen | Birch Creek | 3 | 160 |
| 444 | ------ | City of Los Angeles | Cartago Creek | ---------- | ---------- |
| 467 | ------ | George J. Evans | Wancoba Creek and Lead Canyon Springs | 2.5 | 40 |
| 468 | ------ | George J. Evans | Upper Warm Springs | 1.25 | 40 |
| 469 | ------ | George J. Evans | Indian and Squaw Creek | 2.5 | 40 |
| 470 | ------ | J. F. Gordon | Addie Creek | ---------- | ---------- |
| 494 | ------ | P. A. Blunk, S. E. Ball and Geo. D. Vollmer | Waste water from Skidoo Mill | ---------- | ---------- |
| 507 | ------ | A. and H. A. Nobles | Unnamed spring | ---------- | ---------- |

COUNTY.

| Municipal | | Mining | | Power | | Storage, acre feet | Estimated cost | Status |
|---|---|---|---|---|---|---|---|---|
| Second feet | Population | Second feet | Character | Second feet | Theoretical h.p. | | | |
| | | | | | | | $5,000 | Permit issued. |
| | | | | | | | | Pending. |
| | | | | | | | 1,800 | Pending. |
| | | | | | | | 1,000 | Pending. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | $6,000 | Pending. |
| | | | | | | | 1,000 | Withdrawn by applicant. |
| | | | | | | | 150 | Pending. |
| | | | | | | | 1,200 | Permit issued. |
| | | | | | | | | Withdrawn by applicant. |
| | | | | | | | | Withdrawn by applicant. |
| | | | | | | | 2,000 | Permit issued. |
| | | | | | | | 500 | Permit issued. |
| | | | | | | | 12,000 | Pending. |
| | | | | | | | 100 | Permit issued. |
| | | | | | | | 100 | Pending. |
| | | | | | | | 1,200 | Pending. |
| 1 | | | | | | | | Withdrawn by applicant. |
| | | | | | | 2 | 500 | Rejected. |
| | | | | 65 | 26,770 | 4,695 | 1,500,000 | Pending. |
| | | | | 23 | 10,910 | 8,554 | 580,000 | Pending. |
| | | 1 | Milling | | | | 2,000 | Withdrawn by applicant. |
| | | | | | | | 800 | Permit issued. |
| | | | | | | | 2,500 | Permit issued. |
| | | 0.25 | Milling | | | | 500 | Withdrawn by applicant. |
| | | | | | | | 2,500 | Withdrawn by applicant. |
| | | | | | | | 200 | Rejected. |
| | | | | | | | 200 | Rejected. |
| | | | | | | | 100 | Rejected. |
| | | 0.1 | Milling | | | | 750 | Permit issued. |
| | | | | | | | 25 | Pending. |
| | | | | | | | 750 | Permit issued. |
| | | 0.35 | Potash, Borax, Soda | | | 1 | 8,000 | Pending. |
| | | | | | | | 500 | Permit issued. |
| | | | | | | | 500 | Pending. |
| | | | | | | | 500 | Pending. |
| 10 | 600,000 | | | | | | | Pending. |
| | | | | | | | 175 | Pending. |
| | | | | | | | 200 | Pending. |
| | | | | | | | 275 | Pending. |
| | | 1 | Milling | | | | 2,000 | Pending. |
| | | 0.025 | Milling | | | | 5,000 | Pending. |
| | | 0.5 | Milling | | | | 1,500 | Pending. |

## KERN

| Application No. | Permit No. | Applicant | Source | Agricultural | |
|---|---|---|---|---|---|
| | | | | Second feet | Acres |
| 55 | 63 | W. J. Newenham | Red Rock Canyon | 2.5 | 200 |
| 69 | ------ | Tulare Water Co. | Kern River | 2,000 | 78,770 |
| 101 | 26 | Arthur E. Barr | Unnamed springs | 1 | 80 |
| 105 | 45 | W. S. Russel | Plato Stream | 2 | 160 |
| 134 | 48 | A. F. Mansfield | Unnamed springs | 1 | 325 |
| 179 | ------ | Ramina Corporation | Unnamed stream | 2 | 960 |
| 204 | ------ | J. B. Brite | Brite Creek | 2.5 | 320 |
| 215 | 75 | C. H. Heldman | Iron Spring | 0.025 | 440 |
| 226 | 85 | Oscar Glanville et al. | Cottonwood Creek | 4.7 | 375 |
| 239 | ------ | Oak Creek Land and Water Co. | Oak Creek watershed | 70 | 8,320 |
| 250 | 119 | John Ripley | Canebrake Creek | 1.25 | 100 |
| 266 | 133 | Chris. L. Wirth | Unnamed stream | 1.25 | 100 |
| 274 | 97 | F. G. Dilthey | North Fk. Kern River | 0.75 | 60 |
| 276 | ------ | Mojave Mutual Land & Water Co. | Oak Creek watershed | 70 | 61,440 |
| 309 | 150 | G. F. Dair | Unnamed stream | 1.4 | 140 |
| 317 | ------ | Barclay McCowan | Kern River | 10,000 | ---------- |
| 328 | 156 | G. W. Gates and J. W. Chastian | Dry wash from Tehachapi | 3 | 460 |
| 345 | 149 | J. F. Lingo | Bitter Creek | 0.625 | 40 |
| 350 | ------ | Barclay McCowan | Kern River | 25,000 | ---------- |
| 358 | 179 | Richard Clayton | Erskine Creek | 0.75 | 60 |
| 372 | 143 | E. Heussard and J. Bosshard | Cottonwood Creek | 0.75 | 25 |
| 377 | ------ | S. L. Miller | Barrel Springs | 2 | 760 |
| 386 | ------ | Barclay McCowan | Caliente Creek | 500 | ---------- |
| 387 | ------ | Barclay McCowan | Walker Basin | 100 | ---------- |
| 409 | ------ | Loren H. Sterling | Dixie Wash | 20 | 155 |

## KINGS

| | | | | | |
|---|---|---|---|---|---|
| 324 | ------ | Guaranty Land and Invest. Co. | Cross Creek | 100 | 3,880 |
| 353 | ------ | A. D. Schindler | South Fk. Kings River | 2,000 | 250,000 |
| 354 | ------ | A. D. Schindler | Kern River | 2,000 | 250,000 |
| 355 | ------ | A. D. Schindler | Tule and Kaweah rivers | 1,000 | 250,000 |
| 413 | ------ | Robert Cords, Jr. | Avenal Creek | 20 | 640 |
| 505 | ------ | Kings County Land & Cattle Co. | ---------- | 24 | 480 |

## LAKE

| | | | | | |
|---|---|---|---|---|---|
| 26 | 4 | W. H. Hill | Alder Creek | 0.12 | 40 |
| 164 | ------ | Sydney Dale | Unnamed spring | 0.04 | 40 |
| 342 | ------ | Mary E. Jewell | Gallagher Creek | 0.37 | 15 |
| 391 | ------ | Britton & Goldaracena | Gallagher Creek | 0.19 | 60 |
| 407 | ------ | R. J. R. Aden | Putah Creek | 5.5 | 615 |

## LASSEN

| | | | | | |
|---|---|---|---|---|---|
| 7 | ------ | R. S. Nickerson and E. S. Pickard | Willow Creek | 6 | 320 |
| 25 | ------ | W. H. Earle et al. | Long Valley Creek | 138 | 50,000 |
| 65 | ------ | H. C. Jack | Willow Creek | 4 | 140 |
| 66 | ------ | Colonel W. Pogue | Silver Creek | 5 | 180 |
| 72 | ------ | W. H. Paulk | Ash Creek | 10 | 220 |
| 73 | ------ | Paul J. Hopper | Ash Creek | 4 | 100 |
| 79 | ------ | Andrew Babcock | Ash Creek | 12 | 440 |
| 80 | ------ | Alfred Babcock | Ash Creek | 5 | 160 |
| 81 | ------ | Earnest Babcock | Ash Creek | 5 | 160 |
| 85b | ------ | Southern Lassen Irrigation Dist. | Long Valley Creek | 300 | 22,565 |
| 103 | ------ | Milton Babcock | Ash Creek | 4 | 125 |
| 158 | ------ | Kasper Weigand | Willow Creek | 2 | 60 |
| 171 | ------ | Herman T. Vockel | Seepage water | 2 | 320 |
| 176 | 51 | Z. Johnson | Unnamed stream | 2 | 860 |
| 182 | 80 | W. A. Brubeck | Gillman Stream | 2 | 160 |
| 188 | ------ | A. Anderson | Red Rock Creek | 6 | 160 |

| Municipal | | Mining | | Power | | Storage, acre feet | Estimated cost | Status |
|---|---|---|---|---|---|---|---|---|
| Second feet | Population | Second feet | Character | Second feet | Theoretical h.p. | | | |
| **COUNTY.** | | | | | | | | |
| | | | | | | | $8,000 | Permit issued. |
| | | | | | | | 200,000 | Pending. |
| | | | | | | | 25 | Permit issued. |
| | | | | | | | 200 | Permit issued. |
| | | | | | | | 1,000 | Permit issued. |
| | | | | | | 15 | 2,000 | Pending. |
| | | | | | | 10 | 1,000 | Pending. |
| | | | | | | | 500 | Permit issued. |
| | | | | | | 58 | 17,500 | Permit issued. |
| | | | | | | 6,000 | 500,000 | Pending. |
| | | | | | | | 250 | Permit issued. |
| | | | | | | | 250 | Permit issued. |
| | | | | | | | 500 | Permit issued. |
| | | | | | | 50,000 | 400,000 | Rejected. |
| | | | | | | 2 | 450 | Permit issued. |
| | | | | | | 250,000 | | Pending. |
| | | | | | | 2 | 2,500 | Permit issued. |
| | | | | | | | 20 | Permit issued. |
| | | | | | | 750,000 | | Pending. |
| | | | | | | | 150 | Permit issued. |
| | | | | | | | 300 | Permit issued. |
| | | | | | | 2 | 4,500 | Pending. |
| | | | | | | | | Pending. |
| | | | | | | | | Pending. |
| | | | | | | | 300 | Pending. |
| **COUNTY.** | | | | | | | | |
| | | | | | | | $16,500 | Pending. |
| | | | | | | 300,000 | | Pending.* |
| | | | | | | 300,000 | | Pending.* |
| | | | | | | 300,000 | | Pending.* |
| | | | | | | | 1,250 | Pending. |
| | | | | | | | | Pending. |
| **COUNTY.** | | | | | | | | |
| | | | | | | | $1,000 | Permit issued. |
| | | | | | | | 300 | Withdrawn by applicant. |
| | | | | | | | 250 | Pending. |
| | | | | | | | 600 | Pending. |
| | | | | | | | 4,000 | Pending. |
| **COUNTY.** | | | | | | | | |
| | | | | | | | $500 | Pending. |
| | | | | | | 100,000 | 1,000,000 | Rejected. |
| | | | | | | | 1,000 | Pending. |
| | | | | | | 80 | 550 | Pending. |
| | | | | | | | 500 | Pending. |
| | | | | | | | 500 | Pending. |
| | | | | | | | 500 | Pending. |
| | | | | | | | 500 | Pending. |
| | | | | | | | 500 | Pending. |
| | | | | | | | 500 | Pending. |
| | | | | | | 100,000 | 400,000 | Pending. |
| | | | | | | | 500 | Pending. |
| | | | | | | | 500 | Pending. |
| | | | | | | | 550 | Rejected. |
| | | | | | | 1,427 | 2,500 | Permit issued. |
| | | | | | | | 150 | Permit issued. |
| | | | | | | 80 | 1,500 | Pending. |

*Proposed Tulare Lake Water District.

## LASSEN COUNTY

| Application No. | Permit No. | Applicant | Source | Agricultural | |
|---|---|---|---|---|---|
| | | | | Second feet | Acres |
| 195 | 195 | Mary J. Abbott | Mud Spg. Cr. and Love Cr. | 3 | 240 |
| 202 | ------ | M. Garnier and F. Osborn | Long Valley Creek | 25 | 245 |
| 203 | ------ | Leon Bly | Eagle Lake | 42 | 19,240 |
| 268 | ------ | John F. Mauck | Honey Lake | 166 | ---------- |
| 269 | ------ | W. L. Wales | Willow Creek | 500 | 50,000 |
| 280 | ------ | W. L. Wales | Susan River | 500 | 50,000 |
| 281 | ------ | W. L. Wales | Eagle Lake | 500 | 50,000 |
| 293 | ------ | W. L. Wales | Skeedaddle Creek | 500 | 50,000 |
| 426 | ------ | W. L. Wales | Butte Creek | 200 | 40,000 |
| 427 | ------ | W L. Wales | Horse Lake | 200 | 40,000 |
| 292 | ------ | Leon Bly | Balls Canyon Creek and Willow Creek | 500 | ---------- |
| 302 | ------ | Leon Bly | Susan River | 20 | ---------- |
| 401 | ------ | Wm. H. Earle | Long Valley Creek | 550 | 34,345 |
| 439 | ------ | Nora Dorton | Wall Canyon Creek | 0.5 | 48 |

## LOS ANGELES

| | | | | | |
|---|---|---|---|---|---|
| 12 | ------ | Birch Oil Co. | Canada del Rodeo | 0.875 | ---------- |
| 16 | 30 | P. M. Young | Kerr and Icy Springs | 0.25 | 160 |
| 30 | ------ | Little Baldy Water Co. | Deadman's Canyon | 125 | 2,280 |
| 38 | ------ | C. R. Bandle | Big Rock Creek | ---------- | ---------- |
| 49 | ------ | Bertha E. Fitch | Unnamed spring | 0.025 | ---------- |
| 53 | 3 | W. F. Pipher | Unnamed spring | 1 | 24 |
| 57 | ------ | J. H. Rylands | Cold Spring Canyon | 1 | 5 |
| 68 | ------ | G. E. McCoy | Santa Clara River | 5 | 110 |
| 70 | 140 | D. M. Furnivall | Santa Clara River | 0.5 | 40 |
| 84 | ------ | Cabazon Water Co. | Millard Canyon | 25 | 2,800 |
| 90 | ------ | Mrs. H. C. Gill | W. Fork, Saucer & Millard Creeks | 5 | 320 |
| 95 | ------ | F. G. Brooks | Big Tejunga River | 625 | ---------- |
| 97 | ------ | W. F. Erwin | Unnamed spring | 0.25 | 20 |
| 98 | 64 | Georges Fusenot | Ward and Oak canyons | 0.15 | 40 |
| 106 | ------ | Nelly B. Markell | Unnamed springs | 0.25 | ---------- |
| 108 | 116 | Citrus Improvement Co. | Ham Canyon | 0.25 | 80 |
| 113 | 28 | D. P. Flory | Keagle Canyon Extension | 0.50 | 280 |
| 128 | ------ | Daniel Curtis | Durant Springs | 0.05 | 146 |
| 129 | 33 | Renner E. Erwin | Unnamed springs | 0.875 | 70 |
| 130 | 25 | G. W. Haight | Canada De Los Aliso | 1.25 | 150 |
| 163 | 52 | B. C. Kingsbury | Unnamed springs | 0.01 | 40 |
| 178 | ------ | Llano Del Rio Co. | Big Rock Creek | 3,000 | 4,710 |
| 180 | 53 | R. P. Dalton | Unnamed springs | 0.075 | 10 |
| 192 | 83 | Edwin Bemis | Unnamed springs | 0.5 | 40 |
| 227 | ------ | W. M. Putnam | Unnamed spring | 1 | 135 |
| 267 | 126 | F. W. Gross | Unnamed spring | 0.03 | 10 |
| 272 | 88 | L. F. Elser | Unnamed spring | 0.05 | 160 |
| 273 | 96 | Titto Bros. | Unnamed spring | 0.08 | 15 |
| 283 | ------ | M. L. Hazzard | San Dimas & Cow canyons | 2,250 | ---------- |
| 291 | 135 | H. L. Heffner | Unnamed spring | 0.05 | 2 |
| 298 | ------ | H. A. Unruh | Big Santa Anita Stream | 5 | 200 |
| 303 | 130 | W. L. Hagenbaugh | Boulder Creek | 3 | 240 |
| 308 | 129 | D. Southwell | Coyote Springs | 0.01 | 20 |
| 310 | ------ | H. C. Dunn | Pallet Creek | 1 | 100 |
| 314 | ------ | Louis Luckel | Marengo Storm Drain | 0.01 | ---------- |
| 319 | ------ | Carter Investment Co. | Flowing well | 2.5 | 285 |
| 336 | ------ | C. F. Earle | Unnamed spg. and stream | 0.625 | 75 |
| 352 | 134 | J. A. Brown | Unnamed spring | 0.01 | 80 |
| 369 | 162 | George Stewart | Underground stream | ---------- | ---------- |
| 382 | 146 | W. C. Longstreth | Canyon Spring | 0.33 | 25 |
| 384 | ------ | California Highway Commission | Salt Creek | 0.25 | ---------- |
| 398 | ------ | Llano Del Rio Co. | Big Rock Creek | 3,000 | 4,710 |
| 422 | 127 | Louis Luckel | Marengo Storm Drain | 0.04 | ---------- |

—Continued.

| Municipal | | Mining | | Power | | Storage, acre feet | Estimated cost | Status |
|---|---|---|---|---|---|---|---|---|
| Second feet | Population | Second feet | Character | Second feet | Theoretical h.p. | | | |
| | | | | | | | 800 | Permit issued. |
| | | | | | | | 3,000 | Pending. |
| | | | | | | | 300,000 | Pending. |
| | | | | | | | 600,000 | Withdrawn by applicant. |
| | | | | | | | | Pending.* |
| | | | | | | | | Pending.* |
| | | | | | | | | Pending.* |
| | | | | | | | | Pending.* |
| | | | | | | | | Pending.* |
| | | | | | | | | Pending.* |
| | | | | | | 50,000 | | Pending.* |
| | | | | | | | † | Pending. |
| | | | | | | 135,000 | 1,000,000 | Pending. |
| | | | | | | | 100 | Pending. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | $500 | Pending. |
| | | | | | | | 1,000 | Permit issued. |
| | | | | | | | 10,000 | Pending. |
| | | | | | | | | Withdrawn by applicant. |
| | | | | | | | | Withdrawn by applicant. |
| | | | | | | 1 | 250 | Permit issued. |
| | | | | | | | 1,200 | Pending. |
| | | | | | | | 200 | Rejected. |
| | | | | | | | 75 | Permit issued. |
| | | | | | | 80 | 25,000 | Pending. |
| | | | | | | 1 | 500 | Pending. |
| | | | | | | | | Rejected. |
| | | | | | | | | Permit issued. |
| | | | | | | | 4,000 | Permit and license issued. |
| | | | | | | | | Rejected. |
| | | | | | | 1 | 1,500 | Permit issued. |
| | | | | | | | 2,000 | Permit issued. |
| | | | | | | | 600 | Withdrawn by applicant. |
| | | | | | | | 500 | Permit issued. |
| | | | | | | 12 | 5,000 | Permit issued. |
| | | | | | | | | Permit issued. |
| | | | | | | 7,500 | | Rejected. |
| | | | | | | | 600 | Permit issued. |
| | | | | | | | 500 | Permit issued. |
| | | | | | | | 3,200 | Pending. |
| | | | | | | 1 | 250 | Permit issued. |
| | | | | | | | 400 | Permit issued. |
| | | | | | | | 500 | Permit issued. |
| | | | | | | 15,000 | 350,000 | Pending. |
| | | | | | | | 250 | Permit issued. |
| | | | | | | 275 | 30,000 | Rejected. |
| | | | | | | 4 | 500 | Permit issued. |
| | | | | | | | 150 | Permit issued. |
| | | | | | | | 1,000 | Pending. |
| | | | | | | | 100 | Superseded by Ap. 422. |
| | | | | | | 1 | 5,000 | Rejected. |
| | | | | | | | 1,050 | Pending. |
| | | | | | | | 250 | Permit issued. |
| | | 0.025 | Placer | | | | 300 | Permit issued. |
| | | | | | | | 1,000 | Permit issued. |
| | | | | | | 2 | 30,000 | Pending. |
| | | | | | | 7,500 | 130,000 | Pending. |
| | | | | | | | 150 | Permit issued. |

*Honey Lake Valley Irrigation District.
†Included in No. 208.

## LOS ANGELES

| Application No. | Permit No. | Applicant | Source | Agricultural | |
|---|---|---|---|---|---|
| | | | | Second feet | Acres |
| 425 | ------ | City of Arcadia | Big Santa Anita and Clamshell creeks | | |
| 430 | ------ | L. E. Winsor | Unnamed canyon | 1.25 | 100 |
| 446 | ------ | C. H. and Carrie B. Cobb | Los Flores Canyon stream | 1.10 | 18 |
| 447 | ------ | C. H. and Carrie B. Cobb | Los Flores Canyon stream | | |
| 460 | ------ | P. Siemens and S. Kuenzel | Unnamed spg. and stream | 2 | 120 |
| 463 | ------ | A. F. George | Unnamed spring | 0.625 | |
| 464 | ------ | A. J. Krystosiak | Unnamed springs | 2 | 120 |
| 473 | 197 | Mary A. F. Geft | Spring in dry arroyo | 0.33 | 40 |
| 474 | ------ | Harry Heath | Mountain spring | 0.002 | 33 |
| 492 | ------ | F. H. Mogle and G. Mox | Unnamed canyons | 1 | 40 |
| 518 | ------ | G. Blum et al | Aliso and Gleason canyons | 1.25 | 100 |

## MADERA

| | | | | | |
|---|---|---|---|---|---|
| 207 | ------ | White and Friant Lumber Co. | Whiskey Creek | | |
| 257 | ------ | White and Friant Lumber Co. | Sand Creek | | |
| 234 | ------ | Madera Irrigation District | San Joaquin R., Fresno R., Chowchilla R., Sand Cr., Cottonwood Cr., Hildreth Cr., Dry Cr., and Mariposa Cr. | 5,000 | 400,000 |
| 510 | ------ | Mrs. Emmy Lorke | Whiskey Creek | 1 | |

## MARIN

| | | | | | |
|---|---|---|---|---|---|
| 216 | 147 | N. L. Fitzhenry | Mineral Springs | 0.1 | |

## MARIPOSA

| | | | | | |
|---|---|---|---|---|---|
| 33 | ------ | E. Sasser | Unnamed springs | 0.01 | |
| 471 | ------ | F. M. Ish | | | |

## MENDOCINO

| | | | | | |
|---|---|---|---|---|---|
| 46 | 6 | O. Cooper | Eden Creek | 1.5 | 40 |
| 99 | 27 | E. R. Caldwell | Wilson Creek | 0.07 | 5 |
| 124 | ------ | W. G. Henshaw | Eden Creek | 3 | 60 |
| 168 | 56 | N. W. P. Railroad | Poonkinney Creek | 0.15 | |
| 396 | 192 | A. Sbragia | Rouse Creek | 0.02 | 30 |
| 431 | 175 | O. A. Thayer | Haehl Creek | 0.14 | 160 |

## MERCED

| | | | | | |
|---|---|---|---|---|---|
| ------ | ------ | None | | | |

## MODOC

| | | | | | |
|---|---|---|---|---|---|
| 44 | ------ | J. R. Leonard | 12-Mile Cr. and Cowhead L. | 1,140 | 50,000 |
| 63 | ------ | J. D. O'Connell | Little Juniper Gulch | | 140 |
| 118 | 40 | M. J. Whitney | "Hole in the Rock" Canyon | | 105 |
| 135 | 69 | G. M. Kelley | Portuguese Flat | | 630 |
| 139 | 103 | E. M. Mason | Clear Lake Hills | | 30 |
| 154 | 44 | F. H. Roberts | Unnamed runoff | | 175 |
| 161 | 39 | James McBrien | Unnamed runoff | | 98 |
| 173 | 66 | J. M. Rogers and A. C. Lester | Unnamed ravine | | 287 |
| 194 | 59 | J. Poindexter and J. L. Davis | Unnamed ravine | | 130 |
| 201 | ------ | A. G. Clausen | Rattlesnake Creek | | 20,000 |

**COUNTY—Continued.**

| Municipal | | Mining | | Power | | Storage, acre feet | Estimated cost | Status |
|---|---|---|---|---|---|---|---|---|
| Second feet | Population | Second feet | Character | Second feet | Theoretical h.p. | | | |
| 7 | 1,200 | | | | | 6 | 25,000 | Pending. |
| | | | | | | | 1,000 | Pending. |
| | | | | | | 5 | 5,000 | Pending. |
| | | 1.1 | | | | | | Pending. |
| | | | | | | | 1,500 | Pending. |
| | | | | | | | 250 | Pending. |
| | | | | | | | 200 | Pending. |
| | | | | | | | 500 | Permit issued. |
| | | | | | | | 250 | Pending. |
| | | | | | | | 3,000 | Pending. |
| | | | | | | | 500 | Pending. |

**COUNTY.**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 25 | Lumbering | | | | $200,000 | Pending. |
| | | 25 | Lumbering | | | 3,000 | | Pending. |
| | | | | | | | 380,000 | Pending. |
| | | | | | | | | Pending. |

**COUNTY.**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | $4,000 | Permit issued. |

**COUNTY.**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Withdrawn by applicant. |
| | | | | 100 | 18,180 | | $1,500,000 | Pending. |

**COUNTY.**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | $750 | Permit issued. |
| | | | | | | | 200 | Permit issued. |
| | | | | | | | 2,100 | Pending. |
| | | | | | | | 3,000 | Permit issued. |
| | | | | | | | 75 | Permit issued. |
| | | | | | | 100 | 500 | Permit issued. |

**COUNTY.**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

**COUNTY.**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 122,480 | $425,000 | Rejected. |
| | | | | | | 600 | 5,000 | Pending. |
| | | | | | | 552 | 550 | Permit issued. |
| | | | | | | 1,428 | 5,750 | Permit issued. |
| | | | | | | 15 | 650 | Permit issued. |
| | | | | | | 953 | 1,800 | Permit issued. |
| | | | | | | 104 | 6,000 | Permit issued. |
| | | | | | | 1,267 | 8,500 | Permit issued. |
| | | | | | | 120 | 200 | Permit issued. |
| | | | | | | 50,000 | | Rejected. |

## MODOC COUNTY

| Application No. | Permit No. | Applicant | Source | Agricultural | |
|---|---|---|---|---|---|
| | | | | Second feet | Acres |
| 246 | 86 | H. P. Wood | Goose L. Corrals Canyon | | 580 |
| 264 | 110 | G. T. Neasham and E. L. Kafader | Lieberman Creek | 3 | 300 |
| 290 | 152 | O. H. Perry | Rye Patch Canyon | 1.875 | 150 |
| 296 | 100 | Boyd Petersen | Unnamed stream | 1.80 | 144 |
| 312 | 113 | J. H. and Laura B. Meredith | Bonner Ravine | | 115 |
| 318 | 155 | W. Birch | Unnamed stream | | 20 |
| 327 | 123 | E. Swanson | E. Fork Rattlesnake Creek | | 155 |
| 338 | 137 | W. J. and P. S. Dorris | Government Corrals Flat | | 400 |
| 375 | 151 | J. W. Fitzhugh | Canyon Creek | | 120 |
| 421 | ------ | Mary E. Ivory | Antelope Plains | | 675 |
| 440 | ------ | J. H. Ake | Unnamed watershed | | 80 |
| 441 | ------ | E. Ivory, Jr. | Ryegrass Swale | | 663 |
| 443 | ------ | *D. M. Eckard and P. B. McBride | Poker Flat Canyon | | 110 |
| 475 | ------ | A. G. Claussen | Portuguese Flat and Canyon Creek | | 127 |
| 486 | 202 | A. P. White | Ralston Creek Flood Area | | 190 |
| 491 | ------ | East Side Land and Water Co. | 12-Mile Cr. and Cowhead L. | 625 | 25,185 |
| 496 | ------ | Frank K. Mott | Ash Creek | | 50,000 |
| 508 | ------ | J. B. Clover | Parsnip Cr. & S. Fork of Pit River | | 40,000 |
| 521 | ------ | G. H. Ayres | Cowhead L. & 12-Mile Cr. | 700 | 40,000 |

## MONO

| | | | | | |
|---|---|---|---|---|---|
| 42 | ------ | W. D. Roberts | Cain Creek | 1 | 160 |
| 51 | 81 | Pacific Power Corporation | Leevining Creek | | |
| 52 | 13 | Pacific Power Corporation | Rush Creek | | |
| 60 | ------ | G. A. Clarke | Fall and Rock Canyon Crs. | 3 | 480 |
| 62 | ------ | J. L. Giroux and F. R. Smith | Piute Creek | | |
| 94 | ------ | H. M. Hall | Rock and Fall creeks | 3.75 | 960 |
| 133 | ------ | J. B. Dugan | Unnamed spring | 3 | |
| 143 | ------ | City of Los Angeles | Leevining Creek | | |
| 144 | ------ | City of Los Angeles | Rush Creek | | |
| 153 | ------ | G. A. Clarke | Pellisier, Hogue and Cinnamon creeks | 4 | 480 |
| 174 | 65 | A. S. Hinkley and W. H. Hawken | Wilson Creek | | |
| 247 | 73 | Mildred M. Gregory | West Gregory Creek | 0.125 | 10 |
| 278 | 114 | Frank Shaw Land and Cattle Co. | Dexter Creek | | 1,680 |
| 335 | ------ | S. M. Merideth and Regina Pierce | Dog Creek | 3 | 160 |
| 340 | 125 | Lillie J. Smith | Unnamed spring | 1.5 | 160 |
| 343 | ------ | Flory, Culp & Flory | Black Canyon | 3 | 355 |
| 346 | ------ | E. H. Dodge | Leevining Creek | 500 | 50,000 |
| 356 | 183 | W. W. Cunningham | Slinkard Creek | 4 | 320 |
| 363 | ------ | D. S. Jones | Robinson Creek | 3 | |
| 399 | 196 | Annie G. Crosby | Piute Creek | 2 | 160 |
| 418 | ------ | George Dorn | Cow Track Spring | 0.05 | |
| 442 | ------ | Mono Canal Co. | Rush and Leevining creeks | 750 | 50,000 |
| 498 | ------ | J. L. Giroux | MacAfee Creek | 12.5 | 440 |

## MONTEREY

| | | | | | |
|---|---|---|---|---|---|
| 110 | 24 | William Grey | Unnamed spring | | |

## NAPA

| | | | | | |
|---|---|---|---|---|---|
| 253 | ------ | B. A. and A. A. Wilson and F. D. Frey | James Creek | | |
| 253a | ------ | B. A. and A. A. Wilson and F. D. Frey | James Creek | | |
| 331 | ------ | Albert Hawkins | Deer Lick Springs | 0.05 | 5 |
| 519 | ------ | Dixon Irrigation District | Putah Creek | | 55,000 |

—Continued.

| Municipal | | Mining | | Power | | Storage, acre feet | Estimated cost | Status |
|---|---|---|---|---|---|---|---|---|
| Second feet | Population | Second feet | Character | Second feet | Theoretical h.p. | | | |
| | | | | | | 1,500 | 500 | Permit issued. |
| | | | | | | 350 | 1,200 | Permit issued. |
| | | | | | | | 75 | Permit issued. |
| | | | | | | | 400 | Permit issued. |
| | | | | | | 12 | 1,000 | Permit issued. |
| | | | | | | 30 | 500 | Permit issued. |
| | | | | | | 180 | 600 | Permit issued. |
| | | | | | | 550 | 1,100 | Permit issued. |
| | | | | | | 65 | 900 | Permit issued. |
| | | | | | | 1,550 | 2,400 | Pending. |
| | | | | | | 69 | 500 | Pending. |
| | | | | | | 893 | 2,200 | Pending. |
| | | | | | | 175 | 2,000 | Pending. |
| | | | | | | 280 | 1,000 | Pending. |
| | | | | | | 146 | 500 | Permit issued. |
| | | | | | | 117,585 | | Pending. |
| | | | | | | 100,000 | 275,000 | Pending. |
| | | | | | | 80,000 | 250,000 | Pending. |
| | | | | | | | 450,000 | Pending. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | $300 | Pending. |
| | | | | 40 | 8,800 | | 717,140 | Permit issued. |
| | | | | 40 | 7,030 | | 788,520 | Permit issued. |
| | | | | | | | 10,000 | Pending. |
| | | 3 | Milling | | | | 10,000 | Withdrawn by applicants. |
| | | | | | | | 1,000 | Pending. |
| | | | | | | | | Rejected. |
| | | | | 40 | 9,400 | 5,920 | 980,000 | Pending. |
| | | | | 45 | 8,621 | 18,890 | 960,000 | Pending. |
| | | | | | | | 10,000 | Pending. |
| | | | | 2 | 100 | | 2,500 | Permit issued. |
| | | | | | | | 40 | Permit issued. |
| | | | | | | 1,110 | 6,500 | Permit issued. |
| | | | | | | | 200 | Pending. |
| | | | | | | | 450 | Permit issued. |
| | | | | | | | 200 | Pending. |
| | | | | | | | 200,000 | Pending. |
| | | | | | | | 1,000 | Permit issued. |
| | | | | | | | | Withdrawn by applicant. |
| | | | | | | | 300 | Permit issued. |
| | | | | | | | 250 | Pending. |
| | | | | | | | 500,000 | Pending. |
| | | | | | | | 6,500 | Pending. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 0.08 | Milling | | | | $100 | Permit issued. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 12.5 | Milling | | | | $500 | Pending. |
| | | | | 0.875 | 10 | | | Pending. |
| | | | | | | | | Withdrawn by applicant. |
| | | | | | | 325,000 | | Pending. |

**NEVADA**

| Application No. | Permit No. | Applicant | Source | Agricultural | |
|---|---|---|---|---|---|
| | | | | Second feet | Acres |
| 67 | ------ | L. Gilmore et al | Little Green Horn Canyon | 125 | ------ |
| 181 | ------ | N. M. Melrose | Diamond Creek | ------ | ------ |
| 181a | ------ | N. M. Melrose | Canyon Creek | ------ | ------ |
| 344 | 171 | J. F. Dunn | South Wolf Creek | 0.725 | 5 |
| 374 | ------ | F. Robins | Big Shady Creek | 6.25 | 8 |
| 478 | ------ | H. O. Kohler and A. Schwartz | Scotchman's Creek | 2 | 1 |
| | | | | | |
| | | | | | |
| | | | | |

**COUNTY.**

| Municipal | | Mining | | Power | | Storage, acre feet | Estimated cost | Status |
|---|---|---|---|---|---|---|---|---|
| Second feet | Population | Second feet | Character | Second feet | Theoretical h.p. | | | |
| | | | | | | | | Rejected. |
| | | 6.25 | Placer | | | | $8,500 | Pending. |
| | | 12.5 | Placer | | | | | Rejected. |
| | | | | | | | 500 | Permit issued. |
| | | | | | | | 550 | Pending. |
| | | | | | | | 4,725 | Permit and license issued |

**COUNTY.**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Withdrawn by applicant. |
| | | | | | | | $2,500 | Permit issued. |

**COUNTY.**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 60 | | | Withdrawn by applicant. |
| | | 2 | Placer | | | | $200 | Pending. |
| | | | | 5 | 568 | | 20,000 | Pending. |
| | | 3 | Placer | | | | | Permit issued. |
| | | | | | | 12 | 400 | Pending. |
| | | | | | | | 15 | Permit issued. |
| | | | | | | | 2,000 | Pending. |
| | | | | | | | 500 | Pending. |

**COUNTY.**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 19,250 | $200,000 | Pending. |
| | | | | 10 | | | | Permit and license issued. |
| | | 2 | Milling | | | | 1,000 | Permit issued. |
| | | 0.2 | Placer | | | | 500 | Pending. |
| | | | | | | | 2,000 | Permit issued. |
| | | | | 530 | 4,800 | | 45,000 | Pending. |
| | | | | 1.25 | 10 | | 400 | Pending. |
| | | | | 20 | 1,170 | | 25,000 | Permit issued. |
| | | 100 | Hydraulic | | | | | Pending. |
| | | | | | | | 375 | Pending. |
| | | | | | | | 1,300 | Pending. |

**COUNTY.**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Permit issued. |
| | | | | | | | | Withdrawn by applicant. |
| | | | | | | | | Rejected. |
| | | | | | | | $181,500 | Pending. |
| | | | | | | | | Permit issued. |
| | | | | | | | 1,000 | Permit issued. |
| | | | | | | | 2,500 | Permit issued. |
| | | | | | | 1,000 | 10,000 | Permit issued. |
| | | | | | | 1 | 150 | Permit issued. |
| | | | | | | | 8,877,500 | Pending. |
| | | | | | | | 2,500 | Permit issued. |
| | | | | | | 1 | 25,000 | Rejected. |
| | | | | | | 27 | 2,300,000 | Pending. |
| | | | | | | | 500 | Pending. |
| | | | | | | 240,000 | | Pending. |
| | | | | | | | 2,000 | Pending. |
| | | | | 12 | 2,740 | | 215,000 | Pending. |
| | | | | 40 | 8,250 | | 606,515 | Pending. |

## SACRAMENTO

| Application No. | Permit No. | Applicant | Source | Agricultural | |
|---|---|---|---|---|---|
| | | | | Second feet | Acres |
| 61 | ------ | O. F. Severson | American River | 100 | 15,000 |
| 138 | 67 | A. Givan | American River | 15 | 3,100 |
| 458 | ------ | Landis Brothers Co. | Dry Creek | ---------- | 100,000 |

## SAN BENITO

| | | | | | |
|---|---|---|---|---|---|
| ------ | ------ | None | ---------- | ---------- | ---------- |

## SAN BERNARDINO

| | | | | | |
|---|---|---|---|---|---|
| 13 | ------ | J. G. Van Zandt | N. tributaries of Mill Cr. | ---------- | ---------- |
| 56 | 18 | Morongo Valley Mutual Water Co. | Big Morongo Creek | 2.5 | 520 |
| 71 | 7 | S. B. Wright and R. Sharpless | Smithson Springs | 0.08 | 80 |
| 88 | 38 | S. W. Gandrean | Four unnamed springs | 0.35 | 29 |
| 107 | ------ | J. E. Bishop | Arrastre Creek | 2.5 | 160 |
| 119 | ------ | E. H. Craft | Unnamed springs | 1 | 160 |
| 120 | 22 | E. H. Craft | Br. of Arrastre Creek | 2 | 160 |
| 121 | ------ | Afton Water, Land and Power Co. | Mojave River | 150 | 40,000 |
| 126 | 50 | J. M. Bradford | Unnamed spring | 0.025 | ---------- |
| 149 | 47 | G. O. Berry | Vincent Springs | 1 | 160 |
| 157 | ------ | G. W. Layman | Springs in Arctic Canyon | 1 | 320 |
| 162 | 57 | O. S. McKinney | Upper Little Morongo Cr. | 3 | 320 |
| 167 | ------ | Peter Siemens | Unnamed spring | 0.5 | 160 |
| 183 | 168 | A. Bila and C. C. Caley | Arctic Canyon | ---------- | ---------- |
| 187 | ------ | Horse Spring Water Co. | Wild Horse Spring | 3 | 240 |
| 193 | 161 | W. H. and J. S. Garrison | Crystal Creek | 1.25 | 200 |
| 218 | ------ | H. D. Lanfair | Dry wash | ---------- | ---------- |
| 240 | 107 | J. Chambers | Horse Spring Gulch | ---------- | ---------- |
| 251 | 89 | Mrs. Phebe J. Henshaw | Davis Springs | 2 | 160 |
| 260 | ------ | O. C. Johnson et al | Stone House Spring | 1 | ---------- |
| 270 | 90 | City of Los Angeles | Unnamed springs | 0.01 | 1 |
| 271 | 91 | City of Los Angeles | Seeley Creek | 0.04 | 2 |
| 284 | ------ | Rock Springs Land and Cattle Co. | Black Diamond Wells | 0.05 | ---------- |
| 285 | ------ | O. C. Johnson et al | Leach's Spring | 0.25 | ---------- |
| 288 | ------ | O. C. Johnson et al | Quail Spring | 0.25 | ---------- |
| 304 | 154 | H. F. Danks | Willow Spring | 0.25 | 40 |
| 315 | ------ | H. A. Cole | Antelope Creek | ---------- | ---------- |
| 320 | ------ | G. C. Howard & Anna L. Mueller | Unnamed springs | 0.12 | 60 |
| 329 | ------ | Ralph Hobbs | Piute Spring | 0.25 | ---------- |
| 337 | 144 | Ivanpah Valley Imp. Co. | Cliff and Boulder canyons | 2 | 8,000 |
| 359 | ------ | W. S. Anderson | Unnamed spring | ---------- | ---------- |
| 364 | ------ | F. M. Carter | Upper Swarthout Canyon and Sheep Creek | 6 | 15,360 |
| 366 | ------ | J. H. Dixon | Horse Canyon underflow | 3 | 120 |
| 383 | ------ | Mamie Johnson | Unnamed springs and crk. | 2 | 160 |
| 404 | 159 | Rock Springs Land & Cattle Co. | Colton Wells | 0.05 | ---------- |
| 415 | ------ | Oak Spring Water Co. | Oak Spring | 3 | 200 |
| 417 | 184 | Sara Brodek | Unnamed canyon | 0.7 | 240 |
| 435 | ------ | Rock Springs Land & Cattle Co. | Clark Spring | 0.05 | ---------- |
| 436 | ------ | Rock Springs Land & Cattle Co. | Mormon Spring | 0.05 | ---------- |
| 437 | ------ | Rock Springs Land & Cattle Co. | Red Rock Spring | 0.05 | ---------- |
| 438 | ------ | W. M. Hunt, Jr. | Deep Creek and West Fork Mojave River | 300 | 50,000 |
| 456 | ------ | S. T. Black | West Fork Mojave River | 3 | 60 |
| 459 | 176 | J. R. Haas | Unnamed springs | 1 | 60 |
| 461 | ------ | C. N. Hewitt | Saw Pit Canyon | 2 | 50 |
| 466 | ------ | J. G. Van Zandt | N. tributaries of Mill Cr. | ---------- | ---------- |
| 483 | ------ | Rock Springs Land & Cattle Co. | Lone Tree Spring | 0.05 | ---------- |
| 484 | ------ | Rock Springs Land & Cattle Co. | Talc. Spring | 0.05 | ---------- |
| 488 | ------ | H. L. Whiston | South Fork of Horsethief Canyon | 3 | 160 |
| 501 | ------ | C. W. Fick | Two unnamed springs | 0.12 | ---------- |
| 509 | ------ | W. B. Baker and F. H. Merril | Pipes Creek and Antelope Creek | ---------- | ---------- |

COUNTY.

| Municipal | | Mining | | Power | | Storage, acre feet | Estimated cost | Status |
|---|---|---|---|---|---|---|---|---|
| Second feet | Population | Second feet | Character | Second feet | Theoretical h.p. | | | |
| | | | | | | | | Rejected. |
| | | | | | | | $52,250 | Permit issued. |
| | | | | | | 100,000 | 1,000,000 | Pending. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 25 | 1,000 | | $500,000 | Superseded by Appl. 466. |
| | | | | | | | 12,300 | Permit issued. |
| | | | | | | | 1,200 | Permit issued. |
| | | | | | | | 300 | Permit issued. |
| | | | | | | | | Rejected. |
| | | | | | | | 250 | Withdrawn by applicant. |
| | | | | | | | 50 | Permit issued. |
| | | | | | | 50,000 | 150,000 | Rejected. |
| | | | | | | | 250 | Permit issued. |
| | | | | | | | 1,500 | Permit issued. |
| | | | | | | | 3,000 | Withdrawn by applicant. |
| | | | | | | | 2,000 | Permit issued. |
| | | | | | | | 500 | Pending. |
| | | 0.38 | Milling | | | | 500 | Permit issued. |
| | | | | | | | 1,500 | Pending. |
| | | | | | | | 2,000 | Permit issued. |
| | | | | | | | | Withdrawn by applicant. |
| | | 0.25 | Milling | | | | | Permit issued. |
| | | | | | | | 160 | Permit issued. |
| | | | | | | | 250 | Rejected. |
| | | | | | | | 25 | Permit issued. |
| | | | | | | | 750 | Permit issued. |
| | | | | | | | 500 | Pending. |
| | | | | | | | 400 | Rejected. |
| | | | | | | | 400 | Rejected. |
| | | | | | | | 500 | Permit issued. |
| | | 1.5 | Milling | | | | 2,000 | Rejected. |
| | | | | | | | 800 | Withdrawn by applicants |
| | | | | | | | | Rejected. |
| | | | | | | 3 | 10,000 | Permit issued. |
| | | | | | | | | Withdrawn by applicant. |
| | | | | | | 3,000 | | Pending. |
| | | | | | | | 3,000 | Pending. |
| | | | | | | | 200 | Pending. |
| | | | | | | | 500 | Permit issued. |
| | | | | | | | 6,000 | Pending. |
| | | | | | | | 7,500 | Permit issued. |
| | | | | | | | 1,000 | Pending. |
| | | | | | | | 150 | Pending. |
| | | | | | | | 150 | Pending. |
| | | | | | | 100,000 | | Pending. |
| | | | | | | | 1,500 | Pending. |
| | | | | | | | 250 | Permit issued. |
| | | | | | | | 450 | Pending. |
| | | | | 25 | 6,330 | | 500,000 | Pending. |
| | | | | | | | 150 | Pending. |
| | | | | | | | 150 | Pending. |
| | | | | | | 3 | 15,000 | Pending. |
| | | | | | | | 200 | Pending. |
| | | | | | | | | Pending. |

## SAN DIEGO

| Application No. | Permit No. | Applicant | Source | Agricultural | |
|---|---|---|---|---|---|
| | | | | Second feet | Acres |
| 4 | ------ | J. M. Mack | Temecula Creek | 25 | 4,000 |
| 8 | ------ | La Mesa, Lemon Grove and Spring Valley Irrigation District | San Diego River | 2,500 | 14,800 |
| 47 | ------ | D. T. Bentley | Unnamed springs | 7.5 | 640 |
| 50 | ------ | J. A. Edmonds | S. branch San Felipe R. | ---------- | ---------- |
| 75 | ------ | F. K. Popham | Unnamed spring and canyon | ---------- | ---------- |
| 96 | ------ | J. A. McCain | Unnamed creek | 2.5 | ---------- |
| 127 | ------ | San Diego Eucalyptus Co. | Wells along Oak Run | 0.5 | ---------- |
| 131 | 34 | Minnie E. Faddis | Unnamed spring | 0.12 | 10 |
| 136 | ------ | J. P. Taggart | Banner and Chariot canyons | ---------- | 10,000 |
| 140 | 35 | G. W. McCain | Spring on Vallecito Creek | 1.2 | 160 |
| 199 | ------ | Fayette O. Lamb | Arkansas and Hunt canyons | 10 | ---------- |
| 219 | ------ | E. A. Orokat | Orifiamme Creek | 3 | 160 |
| 238 | ------ | La Mesa, Lemon Grove and Spring Valley Irrigation District | San Diego River | 2,500 | 14,800 |
| 261 | ------ | Claudie A. Strabley | Cariso Creek | 3.75 | 96 |
| 263 | ------ | Claudie A. Strabley | Cariso Creek | 0.75 | 96 |
| 368 | 172 | R. J. Ruddock | Unnamed spring | 0.025 | 2 |
| 487 | ------ | W. R. Rogers | Unnamed creek | 0.15 | 30 |
| 490 | ------ | E. Fletcher | Santa Maria Creek | 20 | 1,320 |

## SAN FRANCISCO

| | | | | | |
|---|---|---|---|---|---|
| ------ | ------ | None | ---------- | ---------- | ---------- |

## SAN JOAQUIN

| | | | | | |
|---|---|---|---|---|---|
| 100 | 37 | J. W. Squires and R. B. Gilmour | Little John Creek | 1.8 | 140 |
| 301 | ------ | West Side Irrigation District | Old River | 225 | 11,380 |
| 379 | 167 | New England-California Corp. | Stanislaus River | 2.7 | 210 |

## SAN LUIS OBISPO

| | | | | | |
|---|---|---|---|---|---|
| 231 | ------ | Atascadero Mutual Water Co. | Salinas River | 30 | 23,000 |
| 348 | ------ | City of San Luis Obispo | Lopez Creek | ---------- | ---------- |
| 349 | ------ | City of San Luis Obispo | Salinas Creek | ---------- | ---------- |

## SAN MATEO

| | | | | | |
|---|---|---|---|---|---|
| 151 | 112 | John Kyne | San Vincente | 0.22 | 18 |

## SANTA BARBARA

| | | | | | |
|---|---|---|---|---|---|
| 43 | ------ | C. Lillingston | Gobernador Creek | 5 | 1,160 |
| 212 | ------ | Jesse Richardson | Unnamed spring | 0.06 | 2 |
| 311 | 165 | W. L. Jones | Bates Creek | 0.5 | 40 |
| 330 | 124 | A. L. Andrews | Kelsey Creek | 1 | 80 |
| 370 | ------ | Loalda Lands Co. | Zaca Creek | 7.5 | 250 |

## SANTA CLARA

| | | | | | |
|---|---|---|---|---|---|
| 146 | ------ | A. Swickard | Coyote Creek | 160 | 17,000 |
| 232 | 71 | C. B. Cheney | Glenovia Creek | 0.12 | 18 |
| 457 | ------ | J. D. Guerraz | Unnamed stream | 0.02 | 40 |

COUNTY.

| Municipal | | Mining | | Power | | Storage, acre feet | Estimated cost | Status |
|---|---|---|---|---|---|---|---|---|
| Second feet | Population | Second feet | Character | Second feet | Theoretical h.p. | | | |
| | | | | | | | | Rejected. |
| | | | | | | 34,000 | $1,232,500 | Pending. |
| | | | | | | 5 | 3,000 | Rejected. |
| | | | | | | | | Withdrawn by applicant. |
| | | | | | | | | Withdrawn by applicant. |
| | | | | | | | | Withdrawn by applicant. |
| | | | | | | | | Rejected. |
| | | | | | | | 100 | Permit issued. |
| | | | | | | 8,000 | 500,000 | Rejected. |
| | | | | | | 12,000 | 3,000 | Permit issued. |
| | | | | | | | | Rejected. |
| | | | | | | | 4,000 | Pending. |
| | | | | | | 34,000 | 1,232,500 | Pending. |
| | | | | | | | 1,200 | Pending. |
| | | | | | | | 800 | Pending. |
| | | | | | | | 500 | Permit issued. |
| | | | | | | | 400 | Pending. |
| | | | | | | 8,000 | 200,000 | Pending. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | $550 | Permit issued. |
| | | | | | | | 285,000 | Pending. |
| | | | | | | 8 | 1,200 | Permit issued. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 60,000 | $750,000 | Pending. |
| 5 | | | | | | | | Pending. |
| 8 | | | | | | | | Pending. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | $50 | Permit issued. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 706 | $66,800 | Rejected. |
| | | | | | | | 150 | Pending. |
| | | | | | | | 100 | Permit issued. |
| | | | | | | 50 | 1,000 | Permit issued. |
| | | | | | | | | Rejected. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 40,000 | | Rejected. |
| | | | | | | | $250 | Permit issued. |
| | | | | | | | 200 | Pending. |

**SANTA CRUZ**
**SHASTA**

| Application No. | Permit No. | Applicant | Source | Agricultural | |
|---|---|---|---|---|---|
| | | | | Second feet | Acres |
| 15 | 1 | D. T. Gerry | Shingle Creek | 2.5 | 160 |
| 20 | 2 | D. J. Stroup | North Fork Bear Creek | 2.5 | 120 |
| 21 | ------ | E. M. Elliot | Fall River | ---------- | ---------- |
| 112 | 104 | E. A. Schuler | Sheridan Creek | 5 | 640 |
| 184 | ------ | E. G. Hopson | Cow Creek | 40 | 2,960 |
| 185 | ------ | William Watson | Sheridan Creek | 2.5 | 160 |
| 233 | 189 | J. C. Rhoades | Clark Creek | 0.6 | 50 |
| 237 | ------ | T. M. O'Keefe | Cow Creek | 25 | 1,440 |
| 245 | 190 | Alonzo Haley | Clark Creek | 0.52 | 40 |
| 295 | 120 | H. E. Stroup | North Fork Bear Creek | 0.31 | 25 |
| 325 | ------ | J. W. Long, et al | Mid. Fk. Cottonwood Cr. | ---------- | ---------- |
| 351 | ------ | A. K. Lane | Brock Creek | 2.5 | 20 |
| 390 | 194 | G. W. Rice | N. Fork N. Salt Creek | 0.38 | 30 |
| 420 | 188 | J. E. Carney | Hatchet Creek | 2.5 | 200 |
| 434 | ------ | F. M. Conrad | Goose Creek | 17.5 | 110 |
| 453 | ------ | E. E. Pollock | E. Fork Stillwater Creek | 15 | 400 |

**SIERRA**

| | | | | | |
|---|---|---|---|---|---|
| 24 | ------ | H. L. Berkey | Greenwood Creek | ---------- | ---------- |
| 481 | 203 | Twenty-one Mining Co. | Buckeye Ravine | ---------- | ---------- |
| 405 | ------ | T. P. Crowder | Little Truckee River | 100 | ---------- |

**SISKIYOU**

| | | | | | |
|---|---|---|---|---|---|
| 9 | ------ | I. S. Erbentraut | Big Spring Creek | 75 | 1,050 |
| 58 | ------ | Webb Bros. Co. | Shasta River | 5 | 465 |
| 115 | 94 | H. J. Barton | Beaver Creek | ---------- | ---------- |
| 142 | 95 | Thomas Quigley | Beaver Creek | ---------- | ---------- |
| 156 | 62 | J. J. Rinebold | East Fork Taylor Creek | ---------- | ---------- |
| 169 | 55 | John Silva | Scott River | 2.25 | 330 |
| 252 | ------ | F. W. Gooss | Hudson Creek | 2.50 | 50 |
| 275 | 138 | A. E. Keables | Barkhouse Creek | ---------- | ---------- |
| 313 | 186 | C. J. Laird | Lower Klamath Lake | 5 | 150 |
| 385 | 166 | J. T. Rogers | Rogers Creek | 0.47 | 37 |
| 393 | ------ | J. W. Chapman, et al | Mule Creek | ---------- | ---------- |
| 394 | ------ | A. J. Barr | Cold Creek | 1 | 80 |
| 395 | 193 | C. F. Thomain and J. Teukert | New Diggings Creek | ---------- | ---------- |
| 419 | ------ | Webb Bros. Co. | Shasta River | 12 | 1,200 |
| 433 | ------ | Frank Gilloon | Overflow from McCloud River timber company's pipe line | 0.62 | 40 |
| 445 | ------ | B. Casalta | Overflow from McCloud River timber company's pipe line | 1.1 | 154 |
| 448 | ------ | Lucerne Water Co. | Shasta River | 50 | 4,144 |
| 452 | ------ | Martin S. Schuler | Cade Creek | ---------- | ---------- |
| 472 | ------ | E. W. Pereira | Scott River | 125 | 10,000 |
| 512 | ------ | J. A. Mathews | Scott River | 175 | ---------- |
| 514 | ------ | M. Marlahan and J. B. Davidson | Scott River | 7.2 | 287 |
| 525 | ------ | C. H. Barton | Indian Creek | ---------- | ---------- |

**SOLANO**
**SONOMA**
**STANISLAUS**

| | | | | | |
|---|---|---|---|---|---|
| 64 | 77 | Celso Tonella | Stanislaus River | 0.875 | 70 |
| 165 | 58 | Blanche B. Morton | Big Salada Creek | 3 | 280 |
| 405 | 180 | D. E. Kelliher | Little John Creek | 2 | 160 |
| 406 | 181 | Katherine Kelliher | Little John Creek | 0.5 | 40 |
| 504 | ------ | Oakdale Irrigation District | Stanislaus River | 20 | 4,070 |

**COUNTY.—None.**

**COUNTY.**

| Municipal | | Mining | | Power | | Storage, acre feet | Estimated cost | Status |
|---|---|---|---|---|---|---|---|---|
| Second feet | Population | Second feet | Character | Second feet | Theoretical h.p. | | | |
| | | | | | | | $3,000 | Permit issued. |
| | | | | | | | 2,400 | Permit issued. |
| | | | | 1,460 | 50,000 | | | Rejected. |
| | | | | | | | 750 | Permit issued. |
| | | | | | | | 100,000 | Pending. |
| | | | | | | | 200 | Pending. |
| | | | | | | | 800 | Permit issued. |
| | | | | | | | 10,000 | Pending. |
| | | | | | | | 500 | Permit issued. |
| | | | | | | | 250 | Permit issued. |
| | | 12 | Milling | | | | 1,500 | Rejected. |
| | | | | | | | 200 | Pending. |
| | | | | | | | | Permit issued. |
| | | | | | | | 1,000 | Permit issued. |
| | | | | | | | 400 | Pending. |
| | | | | | | 1,200 | 2,000 | Pending. |

**COUNTY.**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 30 | | | | Rejected. |
| | | 1 | Milling | | | | $350 | Permit issued. |
| | | | | | | | | Pending. |

**COUNTY.**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Rejected. |
| | | | | | | | $12,000 | Pending. |
| | | 25 | Placer | | | | 20,000 | Permit issued. |
| | | | | 11 | 160 | | 1,000 | Permit issued. |
| | | 12.5 | Placer | | | | 500 | Permit issued. |
| | | | | | | | 4,000 | Permit issued. |
| | | | | | | | 100 | Withdrawn by applicant. |
| | | 12 | Placer | | | | 5,000 | Permit issued. |
| | | | | | | | 4,000 | Permit issued. |
| | | | | | | | 300 | Permit issued. |
| | | | | 1 | 2 | | 500 | Pending. |
| | | | | | | | 100 | Pending. |
| | | 8 | Placer | | | 1 | 160 | Permit issued. |
| | | | | | | | 20,000 | Withdrawn by applicant. |
| | | | | | | | 8 | Pending. |
| | | | | | | | 125 | Pending. |
| | | | | | | | 50,000 | Pending. |
| | | 12 | Placer | | | | 1,000 | Pending. |
| | | | | | | | 48,500 | Pending. |
| | | | | | | | | Pending. |
| | | | | | | | 1,500 | Pending. |
| | | 12 | Placer | | | | 5,000 | Pending. |

**COUNTY.—None.**

**COUNTY.—None.**

**COUNTY.**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | $2,500 | Permit issued. |
| | | | | | | 83 | 1,500 | Permit issued. |
| | | | | | | | 5,000 | Permit issued. |
| | | | | | | | 1,250 | Permit issued. |
| | | | | | | | 8,000 | Pending. |

## SUTTER

| Application No. | Permit No. | Applicant | Source | Agricultural | |
|---|---|---|---|---|---|
| | | | | Second feet | Acres |
| 221 | ------ | C. E. Williams | Snake River Drain. Ditch | 20 | |
| 333 | ------ | J. R. Catlett | E. by-pass of 1001 Dist. | 7.5 | 960 |

## TEHAMA

| | | | | | |
|---|---|---|---|---|---|
| 316 | ------ | E. G. Hopson & A. L. Conard | Red Bank Creek | 130 | 10,000 |
| 322 | 145 | C. V. Clough | Mill Creek | | 320 |
| 334 | 157 | D. H. Masterson | N. Fork of Stony Creek | 0.5 | 40 |
| 503 | ------ | J. A. Davis, et al. | Lyman Springs | 10 | |

## TRINITY

| | | | | | |
|---|---|---|---|---|---|
| 1 | ------ | R. S. Washington, et al. | Isinglass Lake | | |
| 2 | ------ | George Green | Hennessy Creek | 1.25 | 10 |
| 28 | 20 | W. H. Gray | Pony Bar Creek | 0.44 | 35 |
| 166 | 93 | James Chesbro | Dogwood Creek | 1 | 100 |
| 197 | 61 | L. O. Reese and C. H. Matthews | Rowski Creek | 0.08 | 3 |
| 214 | 70 | Joe Picotte | Price Creek | | |
| 282 | 98 | Henry Black | Baxter Gulch | 0.52 | 25 |
| 321 | 122 | C. H. Matthews | Lambeis Creek | 0.07 | 3 |
| 323 | ------ | W. S. Rose and S. M. Campbell | Manzanita Creek | | |
| 357 | 182 | E. J. Pryor | Manzanita Creek | | |
| 371 | ------ | Louisa S. Paulsen | Rush Creek | | |
| 378 | ------ | B. H. Randolph | Farley Creek | 0.2 | 15 |
| 392 | ------ | F. B. Hoffman | Rowdy and Pelletreau crs. | 0.82 | 11 |
| 410 | ------ | Louisa S. Paulsen | Rush Creek | | |
| 424 | 134 | Elsie R. Luckie | Unnamed spring | 0.01 | 1 |
| 513 | ------ | R. F. Lewis | Spring Gulch | 0.25 | |
| 522 | ------ | Peter Grel | Butter Creek | 3 | 90 |

## TULARE

| | | | | | |
|---|---|---|---|---|---|
| 19 | ------ | John B. Newman Co. | Kaweah River, Mill Creek and Packwood Creek | 25 | 360 |
| 32 | ------ | Terra Bella Irrigation District | Dear Creek | | 12,500 |
| 155 | ------ | J. W. Wilson | White River | | |
| 228 | ------ | Lindsay-Strathmore Irrig. District | S. Fork Kaweah River | | 8,600 |
| 229 | ------ | Lindsay-Strathmore Irrig. District | N. Fork Tule River | | 6,900 |
| 249 | 111 | Matt Burlando | Tobias Creek | 1 | 80 |
| 500 | ------ | City of Los Angeles | S. Fork Kern River | | |
| 520 | ------ | C. W. Guerin | Whitney Creek and S. Fork of Kern River | | |

## TUOLUMNE

| | | | | | |
|---|---|---|---|---|---|
| 109 | ------ | G. F. Lumsden | Jawbone Creek | | |
| 299 | 131 | Eleanor Mining Co. | Jawbone Creek | | |
| 402 | 163 | R. C. Kennedy | Unnamed springs | | |
| 517 | ------ | R. L. Pierson and J. Diamond | Unnamed springs | 2 | 10 |
| 523 | ------ | Hazel Dell Mining Co. | Five Mile Creek | | |

## VENTURA

| | | | | | |
|---|---|---|---|---|---|
| 29 | ------ | Sespe Light and Power Co. | Sespe Creek | 250 | 50.000 |
| 37 | ------ | Richard Tift | Seymour Creek | 1 | 160 |
| 213 | 60 | C. H. Manley | Bitter Creek | 3 | 430 |
| 222 | ------ | J. R. Ghiselin | Piru Creek | | |
| 259 | ------ | Sespe Light and Power Co. | Sespe River | | |
| 455 | ------ | T. C. Wood | Unnamed springs | 2 | 10 |

COUNTY.

| Municipal | | Mining | | Power | | Storage, acre feet | Estimated cost | Status |
|---|---|---|---|---|---|---|---|---|
| Second feet | Population | Second feet | Character | Second feet | Theoretical h.p. | | | |
| | | | | | | | | Rejected. |
| | | | | | | | $250 | Pending. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 30,000 | $400,000 | Pending. |
| | | | | | | 480 | 300 | Permit issued. |
| | | | | | | | 1,600 | Permit issued. |
| | | | | | | | | Pending. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 12.5 | Milling | | | | | Rejected. |
| | | | | | | | $125 | Pending. |
| | | | | | | | 250 | Permit issued. |
| | | | | | | | 500 | Permit issued. |
| | | | | | | | 200 | Permit issued. |
| | | 1 | Placer | | | | 500 | Permit issued. |
| | | | | | | | 150 | Permit issued. |
| | | | | | | | 100 | Permit issued. |
| | | 7 | Placer | | | | 400 | Withdrawn by applicant. |
| | | 5 | Placer | | | | 500 | Permit issued. |
| | | 30 | Placer | | | | 2,000 | Pending. |
| | | | | | | | 400 | Pending. |
| | | | | | | | 350 | Pending. |
| | | 20 | Placer | | | | 5,000 | Pending. |
| | | | | | | | 125 | Permit issued. |
| | | | | | | | 600 | Pending. |
| | | | | | | | 450 | Pending. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Rejected. |
| | | | | | | 25,000 | $900,000 | Pending. |
| | | 7 | Placer | | | | 15,000 | Pending. |
| | | | | | | 10,000 | 230,000 | Pending. |
| | | | | | | 8,000 | 340,000 | Pending. |
| | | | | | | | 750 | Permit issued. |
| | | | | 200 | 18,000 | | 1,500,000 | Pending. |
| | | | | | | 150,000 | | Pending. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2.5 | 12 | | $1,250 | Rejected. |
| | | | | 2 | 80 | | 1,800 | Permit issued. |
| | | 0.1 | Milling | | | | 700 | Permit issued. |
| | | | | | | | 700 | Pending. |
| | | 2.5 | Milling | | | | | Pending. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | $3,000,000 | Pending. |
| | | | | | | | 500 | Pending. |
| | | | | | | | | Permit issued. |
| | | 1,175 | Hydraulic | | | 9,100 | 250,000 | Rejected. |
| | | | | 88 | 10,000 | 57,750 | 2,000,000 | Pending. |
| | | | | | | | | Pending. |

**YOLO**

| Application No. | Permit No. | Applicant | Source | Agricultural | |
|---|---|---|---|---|---|
| | | | | Second feet | Acres |
| 198 | ------ | H. H. Gable | Oat Creek | 2 | 160 |
| 243 | ------ | H. H. Gable | Unnamed springs | 1 | 6 |

**YUBA**

| | | | | | |
|---|---|---|---|---|---|
| 34 | ------ | R. C. Saunders | Mill Creek | 1 | ---------- |
| 361 | 136 | Western Development Co. | Oregon House Creek | 1.12 | 90 |
| 362 | 141 | Emery Hunt | Oregon House Creek | 1.25 | 100 |
| 450 | ------ | R. Whitehead | Plumas L. and Feather R. | 150 | 6,310 |
| 479 | ------ | Farm Land Investment Co. | Feather and Yuba rivers | 100 | 6,802 |
| 480 | ------ | Farm Land Investment Co. | Feather R., Plumas and Messick lakes | 150 | 6,420 |

COUNTY.

| Municipal | | Mining | | Power | | Storage, acre feet | Estimated cost | Status |
|---|---|---|---|---|---|---|---|---|
| Second feet | Population | Second feet | Character | Second feet | Theoretical h.p. | | | |
| | | | | | | 10 | $1,600 | Pending. |
| | | | | | | 8 | 1,600 | Pending. |

COUNTY.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Rejected. |
| | | | | | | 3 | $500 | Permit issued. |
| | | | | | | 2 | 400 | Permit issued. |
| | | | | | | 3,600 | 50,000 | Pending. |
| | | | | | | | 31,000 | Pending. |
| | | | | | | | 31,000 | Pending. |

# AFTER THE WATER, THE PEOPLE.

**Proper Use of the Water Means the Future Population and Prosperity of the State.**

[Address by Irving Martin, member California State Water Commission, before the International Irrigation Congress.]

"Jack and Jill went up the hill to fetch a pail of water." "Went up the hill." We, of California, understand this to mean that the Mother Gooseites left their home in the valley of the San Joaquin, or Sacramento, or one of the many smaller valleys of the state, and scrambled up the high Sierras or the rocky Coast Range hills. They were not going on a picnic; it was a business trip. They were going after water. The enterprise was one fraught with danger and hardships, and you remember its tragic ending. Many other seekers after water have met with as tragic a fate, financially; but we are learning by experience—our own experience, and that of others.

In some respects I can not help thinking that Jack and Jill were wiser than we. It is a fair presumption that when they got the water they intended to put it to some useful and beneficial purpose, as is contemplated under the California water laws, and beyond that, to the highest measure of beneficial use, which is a logical outcome of the theory. They were settlers in the valley; they needed the water for their convenience, for their necessities. They were going after a pailful. They were not going to bring down more water than they could beneficially use. They were not going to waste a drop.

Possibly Jack and Jill were residents of southern California, where water is so valuable that the rivers run underground, self-preservation being Nature's first law. So valuable is water in certain sections that it is not improbable that some day the California State Water Commission will be called on to decide whether a San Bernardino raindrop is riparian or legally subject to appropriation. I am informed by a big abstract firm that frequently it is called on to furnish abstracts on water titles the same as on land titles.

What is it that gives such value to the water in the hills? Why, the fact that Jack and Jill—the people—have use, beneficial use, for it. It is the people that give value to the land, and it is the people that give value to the water. Land, Water, People. As unto the man is the woman, so unto the land is the water to millions of acres in our western domain—useless each without the other. But if the union of the land and the water bring not forth the people in goodly abundance to exercise the art of husbandry, then it is as dead sea apples that turn our meadows into alkali sumps or marshlands.

The development of water for irrigation is essential, is necessary, but closely linked with the development of water should be the development of the people. One is a necessary adjunct of the other. Colonization should be the handmaid of irrigation—not the colonization of the real estate promoter or of the exploiter, but the bringing of the poople to the irrigable land under conditions that give reasonable assurance of success through the application of industry and intelligence.

Great care and prudence should be used in irrigation projects. Old Davy Crockett said: "Be sure you're right, then go ahead." But, even so, it is not advisable to go ahead with too many projects at the same time. Better one enterprise fully developed and supporting the maximum of people than several that are languishing. Presumably, the assignment by the managers of this irrigation congress of two days to be devoted to the subject of colonizing irrigable land carries with it the suggestion that irrigation development has already outrun, or is likely to outrun, sufficient settlement. What better encouragement to irrigation enterprise than is afforded by the object lesson of a project carefully plánned, successfully executed and prosperously tenanted? On the other hand, what greater deterrent than an enterprise ill conceived, or lacking sufficient water, or defective in its carrying out? So, the policy should be, "After the water, the people."

There are certain fundamental requirements for success in an irrigation enterprise: First, and most important of all, the water supply must be safe and sufficient. Then the system of distribution should be thorough and complete. Nearly as important as the water supply itself is the question of water disposal after use—drainage. Care should be taken in the application of water. Excessive use is not beneficial use. Too much water may do as much damage as too little. There are many instructive object lessons where fine, fertile land has been converted into swamps by the excessive use of water or the lack of proper drainage.

Transportation is an essential factor in successful agriculture or horticulture, anywhere. But the biggest factor of all in agricultural success is the price of land.

The poets speak of silver waters, but water would have to be golden to make some land pay at the speculative prices at which it is held. There is a limit to everything—even to the profitable productivity of irrigable lands. An orange grower has had a very profitable year—made a clean-up. Perhaps the preceding year was a good one, and also the one before that; but the next year a frost may come, not only damaging the crop, but killing large numbers of trees; or scale or some other pest may infest the trees. An alfalfa grower may cut several big crops this year and sell at good prices. The next year the price may hardly

allow a profit. Peaches or pears or prunes or raisins may prove profitable one year, and the next year the market may be glutted. Average results are what should count. The record for a series of years is the only intelligent guide. Again, the success of some highly efficient grower is not a fair criterion. All growers are not highly efficient; all farmers are not crackajacks. The acid test of the productive value of land is the results obtained by the average man striking an average for a series of years.

Recently the California State Water Commission was making a trip of inspection. A landowner was very insistent that the commission immediately proceed to make an adjudication of the water rights on a certain creek. Adjudication of the rights—all the rights—on a stream is one of the functions of the commission. The party was very emphatic that the adjudication be done right away—that was what the commission was for, and the matter was one of great urgency. Here is the answer: The party had held for years land which admittedly was priced at about $10 per acre. A certain big enterprise came into the section, and the state had constructed a highway. Result: Land formerly worth $10 an acre now valued at $150. But note the next jump in value in contemplation. If the water rights were adjudicated by the state (at no expense to the landowner)—and the commission was assured that the party held the first right to the water, and of course there was no question in his mind but that the commission would decide in his favor—his land would then go to $500 per acre—selling value, not for taxable purposes, mind. Hence, the great importance of an early adjudication was obvious.

Isn't it just possible that too much water is going into land values in some instances instead of into the ground? There should be millions of drops for irrigation, but not one drop for inflation. On account of high prices much land is lying idle, or is being indifferently cultivated.

Summarizing the essentials for successful irrigation: Safety first in dependable water supply; efficient distribution and proper use; adequate drainage; transportation facilities, and a fifty-fifty price for land.

Located on good irrigable land under these conditions, the farmer should be able to work out his salvation. We need concern ourselves no longer with experimentation or consideration of the subject of whether irrigation pays. No more experiments are necessary. Irrigation is a demonstrated success. It pays. The cultivation of irrigable land is a business, just as is merchandising or manufacturing or transportation or any other business which renders a public service and is entitled to receive a fair profit in return. Cultivation of irrigable land can be made to pay without any special concession or privileges or anything further than the encouragement and legislative help which

can be wisely and legitimately extended to any business. If irrigation can not be made to pay under the conditions specified, then there is something wrong with the land or with the individual; if with the land, it is a wilful waste of water to irrigate it; if the fault lies with the individual, the law of the survival of the fittest will eliminate him in time.

But there are many ways in which government can and very properly should assist in irrigation development. California, as a state, has already gone far in this direction. The greatest step was the legislation providing for the validation of the bonds of an irrigation district by a state commission, comprising the state engineer, the attorney general and the superintendent of banks. Before validating the bonds the commission has looked carefully into the soundness of the irrigation project. It has found that the supply of available water is sufficient for the needs of the district. It has inquired into the fertility of the soil and the necessary amount of water required for irrigation. It has also investigated the provisions for adequate drainage; in fact, the feasibility of the entire project has been gone into thoroughly. In a large way, government is interesting itself, and will take an increasing interest, in the conservation, storage and control of water. Projects that are too big for private capital will be handled by the state or nation, or by the two in conjunction. These bigger things offer an unlimited field for the energies and resources of the government, and it is this direction in which government aid should be extended.

The present water law of California, under which the water commission is acting, was designed to be of practical help to the irrigable land owner, and consideration for the irrigationist played a large part in the drafting of the law. A water right rests on the basis of beneficial use, which prevents the tying up of the water or its holding for speculative purposes. The application of the principle of beneficial use logically should and undoubtedly does mean the largest measure of beneficial use, which is the support of the largest population possible in prosperity and happiness, or, in other words, the colonization of irrigable lands, or the supplying of municipalities with water for domestic purposes.

Under the new California law a water right can not be capitalized beyond the nearly nominal sum expended in acquiring it. Beneficial use and non-capitalization operate effectively to knock out speculation. Another feature of the law is the adjudication of rights—of all the rights—on a stream, and this may be done by the commission of its own initiative, by petition of interested parties, or in suits at law involving water rights the commission may be called in as referee. The settling and establishing of water rights—all the rights—sweep the field

clear of uncertainties, of costly and vexatious litigation, of obstruction, and opens the way for constructive work and development.

All these things the government has done, and rightfully, in aid of the cause of irrigation. No longer should there be any question as to whether the farming of irrigable land will pay. A very important factor in aid of the irrigationist is the attention which is being given and the great progress that is being made in the building of good roads and of interurban electrics. Cheap transportation is a necessary factor and link in profitable agriculture. The motor truck, while yet in its infancy, has proved its efficiency and is destined to play an increasingly important part in the transportation of farm products to market or to shipping depots. As illustrative of the possibilities along this line, I am informed that where the city of Los Angeles originally intended to construct a municipal railway to its deep-sea harbor at San Pedro, it has changed its plan and has decided to build a road for motor trucks to transport freight to and from the seaboard. This is forcefully suggestive of what is likely to take place in the near future. Then, again, who can foretell the possibilities of electric energy as applied to the propelling of vehicles?

With good roads, autos, telephones, rural mail deliveries, fine school facilities, civic centers, almost everything that makes city life attractive, in addition to many features which are denied to the city dweller, life on the irrigable farm should pay in dollars, should pay in health and should pay in pleasure.

# RULES AND REGULATIONS.

The following rules and regulations governing the appropriation of water in California, in accordance with chapter 586, Statutes of 1913, are hereby adopted, to take effect September 1, 1915.

No rule or regulation shall, however, be construed to deprive the commission of its right to exercise the directory and mandatory powers conferred upon it by law, or to limit the amount or character of data required from applicants.

## INTRODUCTORY.

The appropriation of water in California is now governed by the terms of the Water Commission Act (Statutes 1913, chapter 586), which was approved by popular vote at the election held November 3, 1914, and went into effect on December 19, 1914. Rights to the use of water must now be initiated by application to the Water Commission, as section 1415 of the Civil Code, providing for the posting and recording of notices, is no longer in force.

Most of the western irrigation states have adopted similar laws under which the state has assumed direct control of the appropriation and distribution of irrigation waters, in the public interest, in order that such waters shall be put to the highest beneficial use with, as far as may be, an avoidance of long, unnecessary and costly suits to determine the rights of various claimants to the use of the public waters of the state. California is the latest of these states to adopt such a law, and the approval of the act by the people of the state under the referendum of 1914 determines the will of the people that such a step should now be taken in California.

Application blanks have been prepared and will be furnished, free of charge, on request. The blanks are classified according to uses as follows: *Agricultural Purposes, Power Purposes, Mining Purposes, Municipal Water Supply.*

The procedure in acting on an application, very briefly stated, is as follows:

Upon the receipt by the commission of a complete application, published or other form of notice will be given to other users whose rights may be affected and, if protests are filed, hearings may be held to determine if a permit for the use of the water applied for may be granted. The steps to be taken are fully covered under separate headings in the rules adopted.

An application is not a permit to appropriate water until it is approved by the commission. Upon approval of any application, a copy of the original application, with such approval endorsed thereon, will be given to the applicant. In its approval the commission will specify the time for beginning and for completing the work of construction and the time within which the water appropriated must be put to a beneficial use. Such approved application, or permit, will be filed in the office of the commission, and also in the office of the recorder of the county in which the point of diversion lies. When the terms of the permit have been complied with, a license will be issued to the applicant, as evidence of his water right.

For the mutual protection of the applicant and prior claimants, notice of the application will be given so that protests may be filed, if desired. Although vested rights to the use of water from the source from which the appropriation is sought can not be lost, prejudiced or impaired by failure to protest against an application, it is recommended that all prior claimants, for the protection of their own interests, should inform the commission if they have reason to believe that the granting of a permit for the proposed appropriation will conflict with their rights. Unnecessary litigation may be avoided if such action be taken.

A permit or a license to appropriate water is not an assurance by the state of a sufficient water supply, nor a guarantee of protection by the state against prior claimants. It does assure the appropriator that upon compliance with its provisions, his priority is definitely established as of the date of his application, and that in this regard the state will protect him against subsequent claimants.

The commission is authorized by section 24 of the Water Commission Act to ascertain the relative rights of the various claimants to the use of water from a source of supply. Before such ascertainment becomes final and binding, it must be approved, or modified, by the superior court in an action initiated by the state or one of the claimants. Owing to the time thus necessitated in securing a full adjudication of the relative rights, no attempt will be made, in passing upon applications to appropriate, to ascertain all of the existing rights except in unusual cases.

An outline of the procedure relative to ascertainments is set forth in sections 24 to 36, inclusive, of the Water Commission Act. The details of such procedure will be governed by a separate set of rules and regulations.

## RULES AND REGULATIONS.

1. **Priority.** The priority of right secured by an application dates from the time it is filed in the office of the Water Commission, but no application can be considered as filed until the filing fee (see 19 hereof)

has been paid. Defective applications will be returned for correction and sixty days will be allowed for refiling without loss of priority.

2. **The Application.** The application shall be typewritten or written in ink and filed in duplicate.

3. **Source.** Where the water desired is to be taken from more than one stream, lake, or other body of water, a separate application shall be made for each source. It is permissible, however, to specify two or more sources of supply in one application when the water from such sources is to be conveyed to one diverting channel, commingled, and used for one purpose.

4. **Amount.** The amount of water applied for shall be limited to the amount that can be put to beneficial use. Applications for an amount beyond this can not be approved.

5. **Purpose.** A separate application shall be made for the appropriation of water for each of the following purposes: agricultural purposes, power purposes, mining purposes, municipal water supply. The appropriation of water for any of said purposes will include water for domestic purposes. Where it is desired to appropriate water for domestic purposes only, the forms for agricultural purposes should be used. When water has been appropriated for one purpose, it is unlawful to use it for another purpose (excepting domestic purposes) without first securing a permit or license from the commission for such use.

6. **Point of Diversion.** A separate application shall be made for each diversion. It is permissible, however, to specify two or more points of diversion in one application where the proposed conduits are to be used to irrigate the same parcels of land, or convey water to the same power house, or are to be combined into a single conduit.

7. **Maps.** Each application shall be accompanied by a map in duplicate—one copy on tracing linen and the other a print of such tracing. It is not necessary to delay filing an application in order to finish survey and map work. The application, although incomplete, should be filed to avoid loss of priority, and should be accompanied by a statement of the time necessary for the completion of the survey and map and the procurement of other data for perfecting the application.

The map shall be neatly and accurately drawn with India ink, and shall be not larger than 28 inches by 40 inches and not smaller than 24 inches by 36 inches.

The map shall show the location of the point of diversion by courses and distances from some government corner. If on unsurveyed land, the distances and bearings may, if the nearest existing corner of the public survey is more than two miles distant, be taken from a permanent mark on some natural object or permanent monument that can be readily found and recognized. The location of the headgate shall be

indicated. The location of the main ditch or canal shall be shown throughout, and where government survey lines are crossed, frequent ties to section corners shall be shown.

The map shall show the name and location of the stream from which water is to be taken and the location and area (in acres) of land to be irrigated, or place where water is to be used for other purposes. (This may be done by marking the boundaries, or by coloring the areas.) Where the appropriation is for irrigation purposes, the estimated acreage to be irrigated in each 40-acre tract shall be written on the map in all cases where the full 40-acre tract is not to be irrigated.

Wherever the canal line crosses streams, or other ditches, the location of such crossings shall be shown and such intersecting streams and ditches can be more clearly shown by using ink of a different color.

Maps shall show the name of the ditch, canal, or reservoir, and the certificate of surveyor as given below.

If water power is to be developed, a profile of that portion of the canal wherein the power is to be developed shall be shown on the map, or accompany same.

Maps shall be filed with all applications, but for appropriations of three cubic feet per second or less such maps need not be prepared by a surveyor nor conform to the full requirements specified above, unless so ordered by the commission.

The map of a reservoir shall show the total area to be submerged and enough levels to permit of computing its capacity in acre-feet. For large reservoirs, contours of 5 or 10-foot intervals shall be shown.

**CERTIFICATE OF SURVEYOR.**

NOTE.—This certificate shall be neatly lettered on the map and signed by the surveyor.

I, _____, of _____, do hereby certify that this map was made from notes taken during an actual survey made by me (or under my immediate supervision) on _____, 191__, and that it correctly represents the works described in the accompanying application, the location of streams and other ditches in the immediate vicinity, and the acreage to be irrigated.

_____

Surveyor.

8. **Notice.** After an application has been filed in full compliance with the Water Commission Act and the rules and regulations established thereunder for in excess of three cubic feet per second, the commission will instruct the applicant to publish notice thereof, in a form to be prescribed by the commission, in some newspaper of general circulation published within the stream system, selected by the applicant subject to the approval of the commission, once a week for four consecutive weeks (which requirement of publication is hereby construed

to mean, for the purposes of this paragraph, four insertions and no more). Proof of publication shall be filed with the commission within sixty days from the date of its instruction to make publication.

In cases where the application is for the appropriation of not more than three cubic feet per second, the commission will attempt to reach prior appropriators by letter. For this purpose the applicant should use the form printed on the application for submitting a list of the names and addresses of all claimants, known to him, of the waters of the same source below the point of diversion or storage. The commission may order the publication of notice of application for amounts not in excess of three cubic feet per second where it is not practicable to reach the prior appropriators by mail.

9. **Protests.** Any person, corporation or association interested may, at any time within the period specified in the notice, file with the commission a written protest against the granting of said application. A copy of said protest shall be served upon the applicant. It shall set forth the protestant's reasons for the rejection of said application, and affidavits substantiating such reasons shall also be filed when required. Applicant shall file an answer to any protest within the time allowed by the commission. Any answer, brief or form of reply filed herein shall be brought to the attention of the other party by furnishing him with a copy of same. Such copies shall be made and furnished by the person making the charge (or a response to a charge) against an application, as the case may be.

10. **Hearings.** The commission will make an inspection of a proposed appropriation when necessary, and may, in its discretion, if the facts warrant it, set a time and place for holding a hearing. No hearing shall be held except after fifteen days notice by registered mail to both the applicant and protestant, which notice shall give the time and place at which said hearing is to be held.

11. **Subpœnas.** Upon the request of any party, or of its own motion, the commission may issue a subpœna for the production of any persons, papers, records and books in all transactions before said commission. Subpœnas may be served upon the person, or persons, therein named, by any person over the age of twenty-one years. Due proof of such service shall consist of the acknowledgment in writing, or such service by the party named in such subpœna, or by the certificate to that effect of the person serving same.

12. **Witness Fees.** The fees and mileage allowed witnesses called to testify before the commission, as herein provided, by subpœna, shall be the same as those allowed in the superior courts of the state in civil cases, as provided in section 4300*g* of the Political Code of this state. The fees and mileage of any witness shall be paid by the party on whose behalf such witness was called.

13. **Cost of Hearings.** The costs of taking testimony at a hearing shall be borne by the parties thereto as follows: Each party shall pay for the direct examination of his own witness and the cross-examination of opponent's witness and also for the proportionate part of the charges made by the referee. Arrangements for charges hereunder shall be made with such referee or reporter by the parties and all claims or charges against any party shall be settled before the testimony submitted by such party will be considered. One copy of the transcript of testimony taken at the hearing shall be furnished to the commission and the cost thereof borne equally by the parties.

14. **Irrelevant Testimony.** In the event that either party at a hearing shall pursue a line of interrogation of a witness that is clearly irrelevant, the commission shall summarily put a stop to such interrogation.

15. **Briefs.** At the close of a hearing thirty days will be allowed the parties in which to file briefs, which time will be extended upon a showing satisfactory to the commission. Applicant shall file his opening brief within ten days from the close of taking testimony. Protestant shall file his reply brief within fifteen days of the filing of applicant's opening brief. Applicant shall then have five days within which to file his closing brief. Copies of briefs shall be served upon the other party and a duly certified copy, with proof of service on opposing party, shall be filed with the commission.

16. **Attorneys or Agents.** When an applicant or protestant is represented by an agent or attorney, such agent or attorney shall immediately enter his appearance before the commission and thereupon will be recognized as fully controlling the case on behalf of his client. When an applicant or protestant is represented by more than one agent, or attorney, service of notice, or other papers, upon one of such agents or attorneys shall be sufficient.

17. **Power Sites on Public Lands.** No application for the appropriation of water for power purposes involving the use of public lands of the United States will be approved by the Water Commission prior to notification by the proper federal officer that a complete application (with the exception of evidence of water appropriation) for the use of the public lands has been filed in conformity with the regulations of the secretary of the interior or of the secretary of agriculture.

18. **Inspection of Records.** No application, or documents relating thereto, will be allowed under any circumstances to be taken from the custody of the commission; but access to the same, under proper rules, will be permitted.

19. **Filing Fees.** Applications shall be accompanied by the proper fees.

# INTERESTING INFORMATION FOR THE GENERAL PUBLIC AND PROSPECTIVE APPLICANTS.

The terms used in dealing with applications before the Water Commission oftentimes appear to be confusing to some applicants. Below is given some of the principal terms so used, with an explanation of the same which should be found useful to many.

## DUTY OF WATER.

By the term "Duty of Water" is meant the relationship between a given quantity of irrigation water and the area of land it is made to serve. In the irrigation of such crops as alfalfa, etc., it is the practice of the commission to fix the gross duty of the water as 80 acres to the second-foot. By the gross duty is meant the amount of water diverted at the headworks of the canal system and not the actual amount as applied to the land.

## UNITS OF WATER MEASUREMENTS.

*The Inch:* This unit is a variable unit having different meanings in different states. The old miner's inch of California was the quantity of water flowing freely through an opening one inch square, the center of which was four inches below the surface of the water standing above the opening, and which is equivalent to nine gallons per minute or one-fiftieth cubic foot per second. The new California miner's inch is measured under a six-inch pressure, and is equivalent to eleven and one-fourth gallons per minute or one-fortieth cubic foot per second. The commission uses the new California inch in its computations.

*The Second-Foot or Cubic Foot per Second:* This unit represents an exact and definite quantity of water, viz: the equivalent of a stream one foot wide and one foot deep, flowing at the rate of one foot per second.

*The Acre-Foot:* This is the equivalent of a body of water one foot deep over an area of one acre.

## TABLE OF EQUIVALENTS.

One new California miner's inch equals 1/40 cubic foot per second; equals 11¼ gallons per minute; equals 675 gallons per hour; equals 16,200 gallons per day; equals .0495 acre-feet per day.

One second-foot equals 40 new California miner's inches; equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 26,928 gallons per hour; equals 646,317 gallons per day; equals 1.98 acre-feet per day.

One acre-foot equals 43,560 cubic feet.

One million United States gallons per day equals 1.55 second-feet.

One million United States gallons equals 3.07 acre-feet.

One horsepower equals 550 foot-pounds per second.

One horsepower equals 746 watts.

One horsepower equals 1 second-foot falling 8.8 feet.

To calculate theoretical horsepower, multiply amount of water in second-feet by vertical fall in feet, and divide by 8.8.

## A GOVERNMENT CORNER.

In surveying the land originally, the government set stakes or by other means located the four corners of every section. These are called section corners. Half way between these main section corners on every section line are supposed also to have been set the stakes called quarter section corners. In some places these corners will be marked by a mound of rocks or a tree, where a stake is not used. In many instances, even where stakes are set, the field notes of the surveyor will locate that stake by direction and distance from a tree which is known as a "witness tree." As these surveys were made many years ago, as far back as the eighties, a great many of the government corners have become obliterated by one means or another, making it difficult or almost impossible for the average person to find them without the assistance of a surveyor. While it is usual to locate the section corner closest to the proposed point of diversion of water from a stream or other source, any other government section farther away may be used equally as well if it can be located more readily. In locating a government corner, help may be found by going or writing to the Surveyor General of the state for a copy of the original field notes from which description the location of the corner may better be found. The stakes set for government corners were about four inches square, with the section, township and range described on same.

The smallest legal subdivision of the public land survey is 40 acres.

## "BEARING" OR "COURSE" AND DISTANCE.

The expression, "Bearing and Distance," or "Course and Distance," is explained as follows:

By the "bearing" or "course" of a line is meant the smaller of the two angles formed by the north and south line passing through the end of a given line. The bearing is always measured from the north point or the south point so many degrees east or west.

To Illustrate:

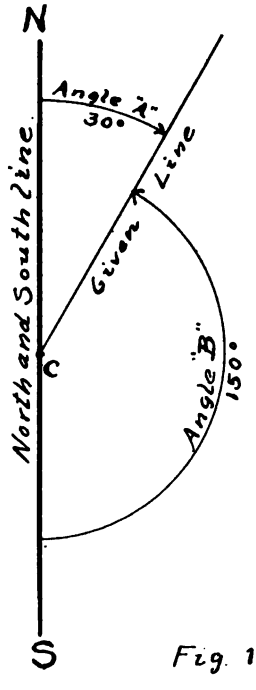



Figure 1.

Figure 1. The north and south line passes through the given line at point "C." The smaller of the two angles made by the north and south line and the given line is angle "A." The direction of the given line is the course or bearing from the point "C," which would be the government corner. This line bears in a northerly direction and 30 degrees east of north, and would be designated as bearing north, 30 degrees east, and if a point of diversion were anywhere on that given line, the above would be the way to express it, of course specifying the number of feet between the two points also.

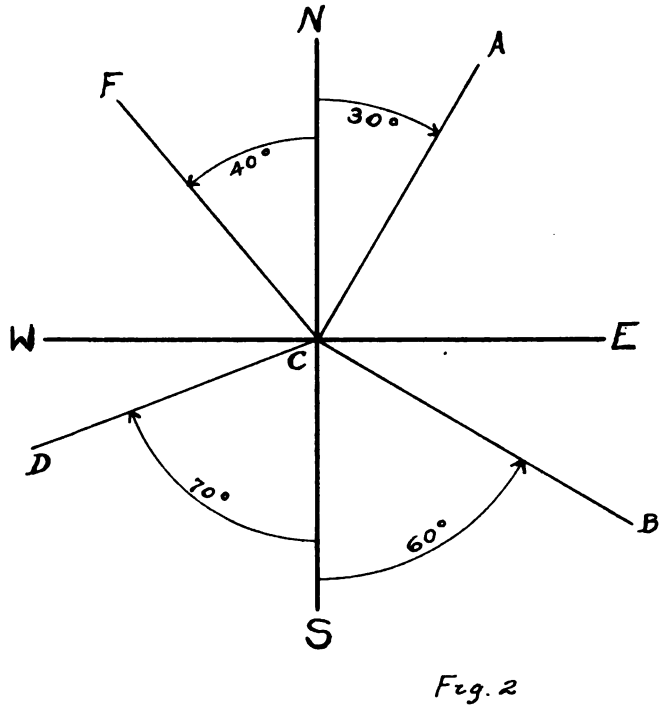



Figure II.

Figure 2. As the bearing of a line is always measured from a north point or a south point so many degrees east or west, the arrows in figure 2 will illustrate the four possible directions in which bearings are measured. Thus the bearing of line "CA" is north, 30 degrees east; that of "CB," south, 60 degrees east; of "CD," south, 70 degrees west; and of "CF," north, 40 degrees west. In any case, "C" would be a government corner and any point on the four lines above mentioned could be the point of diversion.

### How to "Locate" a Point of Diversion:

The average applicant can locate his point of diversion, as required by the commission, without the assistance of a surveyor, by consulting the following:

In the diagram printed below the four main section corners are shown with the four quarter section corners. Assuming that the applicant can more easily locate the quarter section corner on the west line of section 15, he then runs south until at a point directly opposite his point of diversion. Let us say this proves to be 990 feet. He then runs east until he comes to the point of diversion which he finds, say, to be 1,000 feet.

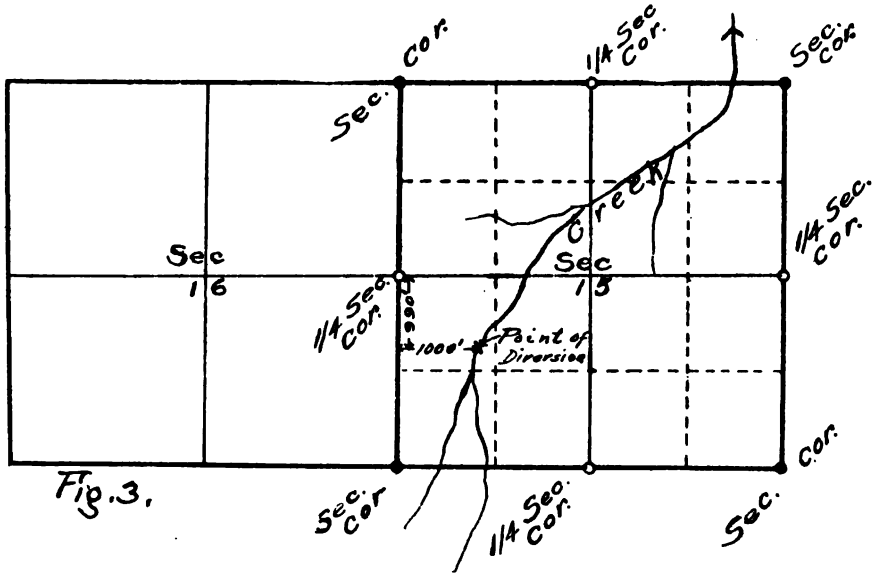



Figure III.

Now, if the engineering department of the Water Commission has information like the above, it can easily compute the "course" or "bearing" and distance of the point of diversion from the government corner. The "course" or "bearing" in this case is the direction in which the point of diversion lies from the quarter section corner used, and the distance will be the number of feet, yards, rods, or whatever the unit of measurement used may be, that the point of diversion is distant from the government corner in a straight line connecting the two points. This same method can be followed by using any government corner which the applicant may choose.

## HOW TO MAKE A MAP.

On opposite page is shown on reduced scale a sample of map which must accompany every application. These small sample maps are supplied to applicants. On this map, examples are given of two separate diversions, a single map being used for the sake of space. The diversion in township 11 is for power purposes, the point of diversion being "tied" by bearing and distance to a government section corner as shown.* The other point of diversion is farther down the stream and is for agricultural or irrigation purposes, as is indicated by the sketch showing ditch line and lands to be irrigated, which are the shaded portion. This diversion is "tied" to a section corner also by bearing and distance. The number of feet should also be given.* This method assures the applicant against any future question as to the exact location of his point of diversion. Two such diversions as are shown on this map could be made on this stream. A power project might divert all the water from the main creek above and conduct it to the power house marked P. H. in section 18. Here, after generating power, it would be turned back into the stream to be taken up and used for irrigation.

*If the point of diversion is located as shown in Fig. 3, the engineering department can compute the bearing and distance for applicant.

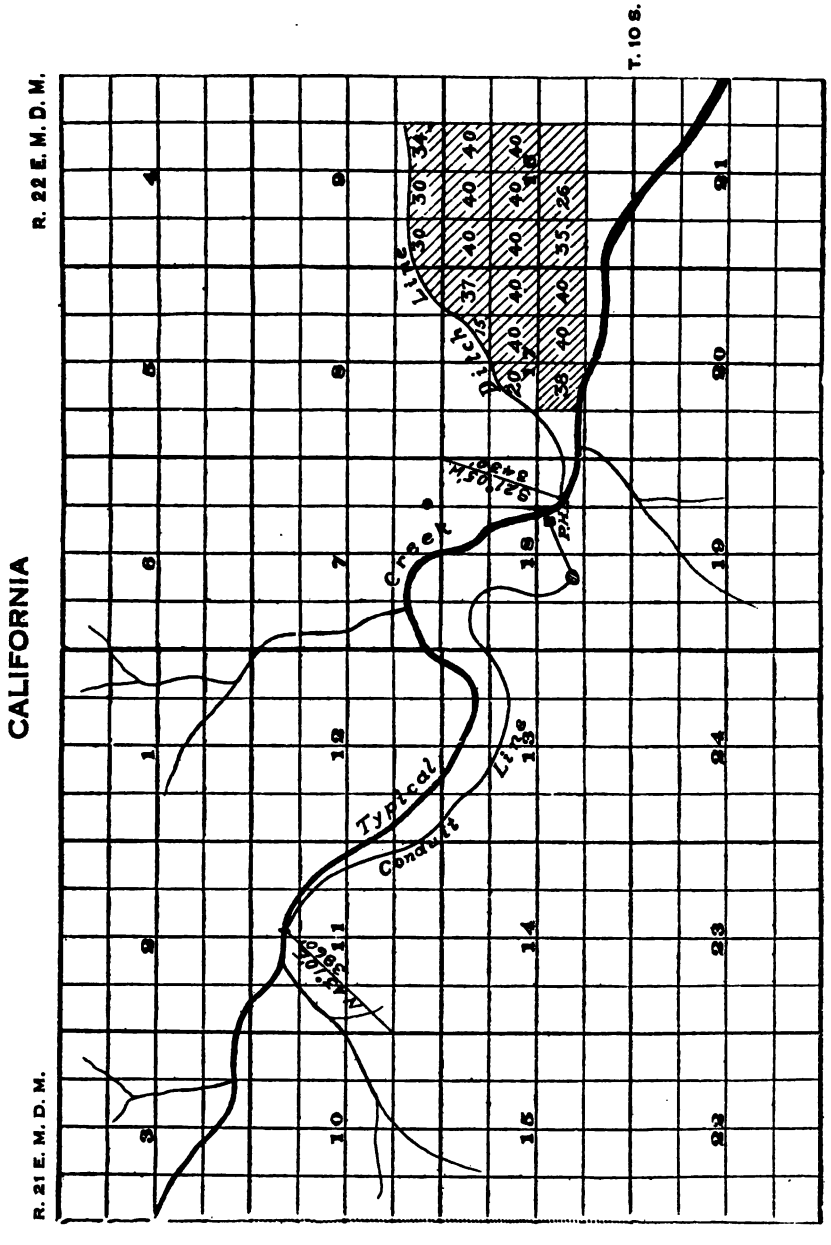

CALIFORNIA
R. 22 E. M. D. M.
R. 21 E. M. D. M.
T. 10 S.
Typical
Conduit
Line
Ditch
Creek

Figure IV.

# FORMS.

**Forms of the Four Different Application Blanks Used by the Water Commission, and Notices for Forest Supervisor, Postmaster, Newspaper and Proof of Appropriation.**

[There are some twenty different forms in all used by the commission under various conditions of the work.]

FILE IN DUPLICATE.

☞For full information regarding the filling out and filing of this form send for Rules and Regulations of the Commission governing appropriation of water.

APPLICATION No._____

APPLICATION FOR A PERMIT

# TO APPROPRIATE UNAPPROPRIATED WATERS OF THE STATE OF CALIFORNIA

## FOR AGRICULTURAL PURPOSES.

I, _____
(Name of Applicant)

of _____County of _____
(Post office)

State of_____, do hereby make application for a permit to appropriate the following described unappropriated waters of the State of California, SUBJECT TO EXISTING RIGHTS:

If the applicant is a corporation, give date and place of incorporation_____

_____

1. The source of the proposed appropriation is_____
(Name of stream, lake, or other source)

located in_____County, tributary of_____

2. The amount of water which the applicant intends to apply to beneficial use is

_____cubic feet per second.
(One cubic foot per second equals 40 miner's inches)

3. The use to which the water is to be applied is_____

4. The point of diversion is located_____

_____

_____
(Give distance and bearing to section corner)

_____

being within the_____
(Give smallest legal subdivision not to exceed 40 acres)

_____

of Sec._____Tp._____R._____, M., in the county of_____

5. The_____to be_____miles in length, terminating
(Main ditch, canal or pipe line)

in the_____of Sec._____
(Smallest legal subdivision)

Tp._____R._____ M., the proposed location being shown throughout on the accompanying map.

6. The name of the ditch, canal or other works is_____

_____

## DESCRIPTION OF WORKS.

**Diversion works—**

7. (*a*) Height of dam_____feet; length on top_____feet; length at bottom _____feet; material to be used and character of construction_____
(Loose rock, concrete,

_____
masonry, rock and brush, timber crib, etc., wasteway over or around dam)

_____

(*b*) Description of headgate_____
(Timber, concrete, etc.,

_____
number and size of openings)

_____

NOTE.—In case of insufficient space for answers in form attach extra sheets.

**Canal system—**

8. Give dimensions at each point of canal where materially changed in size, stating miles from headgate:

(*a*) At headgate: Width on top (at water line)_____feet; width on bottom _____feet; depth of water_____feet; grade_____feet fall per one thousand feet.

(*b*) At_____miles from headgate. Width on top (at water line)_____ feet; width on bottom_____feet; depth of water_____feet; grade_____ feet fall per one thousand feet. (Attach sheet covering other changes.)

**Storage reservoir—**

9. The amount of water to be stored is_____acre-feet.

10. The location of the proposed reservoir will be in_____
(Give 40-acre subdivisions)

_____

_____

_____

11. The dam will be located in_____
(40-acre subdivisions)

Sec._____Tp._____R._____, M. It will be_____feet in height; length on top_____feet; length on bottom_____feet; width on top_____ feet; slope of front or water face_____; slope on back_____;
(Feet horizontal to 1 vertical) (Feet horizontal to 1 vertical)

height of dam above water line when full_____feet.

12. Character of construction of dam and the materials of which it is to be built

_____

_____

13. Estimated cost of proposed works, $_____

14. Construction work will begin on or before_____

15. Construction work will be completed on or before_____

16. The water will be completely applied to the proposed use on or before_____

17. The land to be irrigated has a total area of_____acres, located in each forty-acre tract as follows:

_____

_____

_____

18. Irrigation will begin about_____(Month) and end about_____(Month) of each year.

19. It is understood and agreed that this application and the permit and license which may be granted hereunder shall be subject to all the conditions set forth in Section 20 of the Water Commission Act (Statutes 1913, Chapter 586). (Copy of this section appears on each application).

_____
(Name of Applicant)

_____

Signed in the presence of us as witnesses:

1. _____
(Name) (Address)

2. _____
(Name) (Address)

For the use of the Water Commission in sending notices as provided in Rule 8, Page 8 of Rules and Regulations, the applicant should answer the following questions:

1. What is the name of the post office most used by those living near the proposed point of diversion?_____

_____

2. What are the names and addresses of claimants of water from the source of supply below the proposed point of diversion?_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

PERMIT No.----------

STATE OF CALIFORNIA,
County of----------} ss.

This is to certify that we have examined the application of which the foregoing is a true and correct copy and do hereby grant the same, subject to VESTED RIGHTS and the following limitations and conditions, in addition to those enumerated in Section 20 (Statutes 1913, Chapter 586) set forth above----------

---

---

---

Actual construction work shall begin on or before----------
and shall thereafter be prosecuted with reasonable diligence, and if not so commenced and prosecuted this permit may be revoked.

The amount of water appropriated shall be limited to the amount which can be applied to beneficial use and shall not exceed----------cubic feet per second, or its equivalent in case of rotation.

Said construction work shall be completed on or before----------

---

Complete application of the water to the proposed use shall be made on or before

---

WITNESS our hands this---------day of----------19----

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State Water Commission.

FILE IN DUPLICATE.

☞For full information regarding the filling out and filing of this form send for Rules and Regulations of the Commission governing appropriation of water.

APPLICATION No._____

APPLICATION FOR A PERMIT

# TO APPROPRIATE UNAPPROPRIATED WATERS OF THE STATE OF CALIFORNIA

## FOR MINING PURPOSES.

I, _____
(Name of Applicant)

of _____ County of _____
(Post office)

State of_____, do hereby make application for a permit to appropriate the following described unappropriated waters of the State of California, SUBJECT TO EXISTING RIGHTS:

If the applicant is a corporation, give date and place of incorporation_____

_____

1. The source of the proposed appropriation is_____
(Name of stream, lake, or other source)

located in_____ County, tributary of_____

2. The amount of water which the applicant intends to apply to beneficial use is _____ cubic feet per second.
(One cubic foot per second equals 40 miner's inches)

3. The use to which the water is to be applied is_____

_____

4. The point of diversion is located_____

_____
(Give distance and bearing to section corner)

_____

being within the_____
(Give smallest legal subdivision not to exceed 40 acres)

of Sec._____ Tp._____ R._____, M., in the county of_____

5. The_____ to be_____ miles in length, terminating
(Main ditch, canal or pipe line)

in the_____ of Sec._____
(Smallest legal subdivision)

Tp._____ R._____, M., the proposed location being shown throughout on the accompanying map.

6. The name of the ditch, canal or other works is_____

_____

## DESCRIPTION OF WORKS.

**Diversion works—**

7. (*a*) Height of dam_____feet; length on top_____feet; length at bottom _____feet; material to be used and character of construction_____
(Loose rock, concrete, masonry, rock and brush, timber crib, etc., wasteway over or around dam)

(*b*) Description of headgate_____
(Timber, concrete, etc., number and size of openings)

NOTE.—In case of insufficient space for answers in form attach extra sheets.

**Canal system—**

8. Give dimensions at each point of canal where materially changed in size, stating miles from headgate:

(*a*) At headgate: Width on top (at water line)_____feet; width on bottom _____feet; depth of water_____feet; grade_____feet fall per one thousand feet.

(*b*) At_____miles from headgate. Width on top (at water line)_____ feet; width on bottom_____feet; depth of water_____feet; grade_____ feet fall per one thousand feet. (Attach sheet covering other changes.)

**Storage reservoir—**

9. The amount of water to be stored is_____acre-feet.

10. The location of the proposed reservoir will be in_____
(Give 40-acre subdivisions)

11. The dam will be located in_____
(40-acre subdivisions)
Sec._____Tp._____R._____, M. It will be_____feet in height; length on top_____feet; length on bottom_____feet; width on top_____ feet; slope of front or water face_____; slope on back_____;
(Feet horizontal to 1 vertical) (Feet horizontal to 1 vertical)
height of dam above water line when full_____feet.

12. Character of construction of dam and the materials of which it is to be built

13. Estimated cost of proposed works, $_____

14. Construction work will begin on or before_____

15. Construction work will be completed on or before_____

16. The water will be completely applied to the proposed use on or before_____

Form 9.

## NOTICE FOR PUBLICATION.

(For over 3 cubic feet application.)

**State Water Commission of California**
**Notice of Application to Appropriate Water.**

---

NOTICE IS HEREBY GIVEN, That_____
_____, California, has applied to the State Water Commission of California, for a permit to appropriate for_____purposes_____cubic feet per second of the waters of_____, tributary to_____, to be diverted at a point in the_____
_____
_____
and to be used_____
_____

Any person desiring to protest against the granting of such permit shall, within thirty days from date of last publication hereof, file with the State Water Commission, Call Building, San Francisco, a written protest, stating reasons therefor.

STATE WATER COMMISSION.

By_____
President.

Date of first publication_____

Date of last publication_____

# STATE OF CALIFORNIA

## PROOF OF APPROPRIATION OF WATER FOR IRRIGATION.

---

From _____
Name of natural water source.

Through _____
Name of ditch, flume, or pipe line.

_____, the undersigned, being first duly sworn, deposes and says that the facts relative to the appropriation of water by _____ are full and correct to the best of his knowledge and belief.

_____
If proof is not made by claimant, deponent should state on this line by virtue of what authority he represents the claimant.

_____

1. Name of claimant_____
   Address_____, County of_____
   State of_____
2. The means of diversion employed_____
   Dam and ditch, pipe line, flume, etc.
3. The date of the survey of ditch, canal, or pipe line was_____
4. The construction of the ditch or other works was begun_____
   and completed _____
5. The dimensions of the ditch or canal as originally constructed were: Width on bottom_____feet, width on top_____feet, depth_____feet, on a grade of_____feet per thousand feet.
6. The conduit has (has not) been enlarged.
   NOTE.—If enlargement or extension of ditch was made, supply information under 7 and 8.
7. The work of enlargement of the ditch or canal was begun_____
   and completed_____
8. The dimensions of the ditch or canal as enlarged are: Width on bottom_____ feet, width on top_____feet, depth_____feet, on a grade of_____feet per thousand feet.
9. The claimant is (is not) an owner in the above-described conduit.

   _____
   If claimant is an owner in the conduit, state interest held on this line.
10. The nature of the title to the land for which the water right is claimed is_____
    _____
11. Crops of _____
    have been grown upon the land irrigated.
12. The water has been used for irrigation from_____to_____
    Day of month. Day of month.
    of each year.

13. The water was first used for irrigation by claimant or_____grantors in the year_____when_____acres were irrigated in the_____of Sec._____, T._____, R._____, _____

_____

_____

14. The additional number of acres first irrigated in subsequent years was as follows:

_____, _____acres in the_____of Sec._____, T._____, R._____
Year.

_____, _____acres in the_____of Sec._____, T._____, R._____

_____, _____acres in the_____of Sec._____, T._____, R._____

_____, _____acres in the_____of Sec._____, T._____, R._____

_____, _____acres in the_____of Sec._____, T._____, R._____

_____, _____acres in the_____of Sec._____, T._____, R._____

_____, _____acres in the_____of Sec._____, T._____, R._____

_____, _____acres in the_____of Sec._____, T._____, R._____

_____, _____acres in the_____of Sec._____, T._____, R._____

_____, _____acres in the_____of Sec._____, T._____, R._____

_____, _____acres in the_____of Sec._____, T._____, R._____

_____, _____acres in the_____of Sec._____, T._____, R._____

_____, _____acres in the_____of Sec._____, T._____, R._____

_____, _____acres in the_____of Sec._____, T._____, R._____

Remarks: _____
Append a sheet if necessary.

_____

_____

_____

15. The maximum acreage irrigated in any year was_____acres.

16. The water claimed has (has not) been used for irrigation each and every year
Strike out one not wanted.

since the right was initiated.

17. The years during which no water was used for irrigation or during which the full water right was not used were_____
If water was not used, or used in reduced quantity at any time, full information as to causes and

_____
duration of non-use should be given, appending a sheet if necessary

18. The claimant's water right was (was not) recorded in the office of the County Recorder of_____County, said record being at page_____of Book_____of_____, and being a claim for_____

_____of water for the irrigation of_____

acres of land in the following legal subdivisions:_____

_____

_____

_____

_____

_____

_____

NOTE.—Failure to record in the county in no way invalidates a water right, but if ditch or right was so recorded, supply full information under 19.

19. The map prepared by the State Water Commission is hereby accepted as correctly showing the ditch lines or irrigation works diverting or conveying the water claimed and the lands irrigated.

20. Water from the source given and through the works described is also used for the following purposes other than irrigation:

_____

_____

21. The character of the soil is Sandy, gravelly, loam. The soil needs_____acre-feet per annum to properly irrigate the crops. A continuous flow of_____cubic feet of water per second, during the irrigation season of_____months, is needed to irrigate each 100 acres of land.

Remarks: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Subscribed and sworn to before me this_____day of_____, 19____

_____

_____

_____

o

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